A study of the environmental consciousness of small and medium-sized enterprises in the United Kingdom and Germany

Thesis

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Full Name and Degrees:

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Thesis Title:

A STUDY OF THE ENVIRONMENTAL CONSCIOUSNESS OF SMALL AND MEDIUM-SIZED ENTERPRISES IN THE UNITED KINGDOM AND GERMANY

Discipline:

Geography Discipline, Faculty of Social Sciences

Submitted Degree:

A thesis submitted for the degree of Doctor of Philosophy, September 2001

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GLOSSARY

ACBE	Advisory Committee on Business and the Environment
AktG	*Aktiengesetz* - Shareholder Law
ASU	*Arbeitsgemeinschaft Selbstständiger Unternehmer* - Association of Independent Entrepreneurs
BAT	Best Available Techniques
BAVC	*Bundesarbeitgeber Verband Chemie* - Federation of Chemical Employers' Association
BATNEEC	Best Available Technology Not Entailing Excessive Cost
BBiG	*Berufsbildungsgesetz* - Vocational Training Law
BCC	British Chambers of Commerce
BDI	*Bundesverband der Deutschen Industrie* - Confederation of German Industry
BetrVG	*Betriebsverfassungsgesetz* - Works Council Law
BGBl	*Bundesgesetzblatt* - Federal Law Gazette
BiBB	*Bundesinstitut für Berufsbildung* - Federal Institute for Vocational Training
BImSchG	*Bundesimmissionsschutzgesetz*, Federal Emissions/Air Quality Law
BMBF	*Bundesministerium für Bildung, Wissenschaft,Forschung und Technologie* - The Federal Ministry for Education, Science, Research and Technology
BMFT	*Bundesministerium für Forschung und Technologie* - Federal Ministry for Research and Technology
BMWi	*Bundesministerium für Wirtschaft* - Federal Ministry for the Economy
BMBW	*Bundesministerium für Bildung und Wissenschaft* - The Federal Ministry for Education and Science
BSI	British Standards Institute
BS	British Standards
BUNR	*Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit* - Federal Ministry for the Environment, Wildlife Conservation and Nuclear Safety.
BVerG	*Bundesverwaltungsgericht* - Federal Supreme Administrative Court
CBI	Confederation of Business Industry
CFC	Chlorofluorocarbon
DAB	*Deutsche Ausgleichsbank* - German Equalising Bank
DETR	Department of the Environment, Transport and the Regions
DGB	*Deutscher Gewerkschaftsbund* - Federation of German Trade Unions
DGXI	Directorate General Environment, Nuclear Safety and Civil Protection (Commission of the European Communities)
DGXII	Directorate General for Science, Research and Development (Commission for the European Communities)
DIN	*Deutsche Industrie Norm* - German Industrial Standard
DtA	*Deutsche Ausgleichsbank* (German Bank for Settlements/Economic Equalisation
DTI	Department of Trade and Industry
EA	Environment Act 1995
EARA	Environmental Auditors Registration Association
ECE	Environmental Condition Indicators
EIA	Environmental Impact Assessment
EMAS	Eco-Management and Auditing Scheme
EMS	Environmental Management System
EPA	Environmental Protection Act (1990)
EPE	Environmental Performance Evaluators
EVABAT	Economically Viable Application of Best Available Technology
EU	European Union
EUT	European Union Treaty
GG	*Grundgesetz* - Basic Law
HCFC	Hydrochlorofluorocarbons
HGB	Handelsgesetzbuch - German Commercial Law
HSE	Health and Safety Executive
IEM	Institute of Environmental Managers
IEMA	Institute of Management and Assessment

IG BCE	*IG Bergbau, Chemie, Energie* - The Mining, Chemical and Energy Industrial Union
IHK	*Industrie- und Handelskammer* - Chambers of Industry and Commerce
IKB	*Industriekreditbank* - Industrial Credit Bank
IMPEL	EU Network for the Implementation and Enforcement of Environmental Law
IoD	Institute of Directors
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardisation
KfW	*Kreditanstalt für Wiederaufbau* - Credit Institution for Redevelopment
KMU	*kleine und mittlere Unternehmen* - SME
KrW-/AbfG	*Kreislaufwirtschafts- und Abfallgesetz* - Eco-Cycle and Waste Law
LAAPC	Local Authority Air Pollution Control
LCA	Life Cycle Analysis
MFG	*Mittelstandsförderungsgesetz*, Mittelstand Support Law
NGO	Non-Government Organisation
NVQ	National Vocational Qualification
OECD	Organisation for Economic Cooperation and Development
PPC	Pollution Prevention and Control Act (1999)
PRN	Packaging Waste Recovery Note
QMS	Quality Management System (*Qualtitätsmanagementsystem*)
RDA	Regional Development Agency
SBS	Small Business Service
SCEEMAS	Small Company Environmental and Energy Management Assistance Scheme
SEA	Single European Act
SIC	Standard Industrial Classification
SME	Small and medium-sized Enterprise
SRU	*Der Rat von Sachverständigen für Umweltfragen* - Expert Council on Environmental Affairs
StGB	*Strafgesetzbuch* - Criminal Law Code
TQM	Total Quality Management
TUC	Trades Union Congress
UAG	*Umweltauditgesetz* - Environmental Audit Law
UBA	*Umweltbundesamt* - Federal Environmental Agency
UGB	*Umweltgesetzbuch* - Environmental Law Code
UIG	*Umweltinformationsgesetz* - Environmental Information Law
UMS	*Umweltmanagement System* - Environmental Management System
UStatG	*Umweltstatistikgesetz* - Environmental Statistics Law
UmweltHG	*Umwelthaftungsgesetz* - Environmental Liability Law
VerpackV	*Verordnung über die Vermeidung und Verwertung von Verpackungsabfällen / Verpackungsverordnungen* - Regulation for the Avoidance and Processing of Packaging Waste / Packaging Regulations
VDI	*Verein Deutscher Ingenieure* - Engineers Trade Association)
WHG	*Wasserhaushaltsgesetz* - Water Management Law
WRA	Water Resources Act (1991)
WCED	World Commission on Environment and Development

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Abstract

Business enterprise produces goods and services through the orchestration of factors of production defined in essence by human consumption behaviour. The production and consumption of goods and services are also associated with environmental problems. These socially constructed problems, regardless of the implied incontrovertibility of their dangers, have drawn attention to the importance of sustainable development models as a means of minimising ecological risk. As a consequence of the ecological aspects of business enterprise and its interrelations between the social and physical environment the firm and corporate management have become focus points of attempts to ameliorate environmental change.

The ecological orientation of companies can be defined through their internal, social and economic characteristics as well as psychological factors, which are germane to corporate objectives. The development of corporate ecological orientations is on one hand dependent upon actual or anticipated external changes acting upon the operating frameworks of a firm and on the other hand the existence of relevant management values and intentions expressed through their strategic planning process.

In this research key features of the notion of environmental consciousness are identified and employed to investigate the corporate environmental consciousness of small and medium-sized enterprises in the United Kingdom and Germany. Environmental consciousness comprises cognitive, affective and conative aspects. Accordingly, the research involves an empirical examination of corporate values, attitudes towards environmental commitments and environmental action within firms. The examination is contextualised by socio-economic factors in which business enterprise is conducted in selected industry sectors within the United Kingdom and Germany. The study concludes with a synthesis of the research findings on environmental management practice and experiences of SMEs in each country.

Acknowledgements

The author would like to thank the many organisations and individuals providing assistance and inspiration during this study. Firstly the Geography Discipline for funding the research studentship; my supervisors Dr Mike Pryke during the initial phase of the research project and Professor John Blunden for his constructive criticism and latitude, which allowed me to freely develop and crystallise my ideas. Also to various staff members of the Faculty of Social Sciences attending to my general and specific requirements as a research student.

Sincere thanks to those firm representatives in the UK and Germany committing time and resources to my PhD; the Environment Agency, *Umweltbundesamt*, Department of Trade and Industry, *Bundesverband der Deutschen Industrie*, British Chambers of Commerce, *Industrie Handelskammer zu Köln* and the other experts providing information and support during my research.

Affection and deepest gratitude to my father 'JVH', mother Shirley, sister Shelagh and wife Vera, whose unremitting support and encouragement will not be forgotten.

1 INTRODUCTION

It is generally held that social production is an essential feature of the human condition. The physical environment serves humankind's basic needs and is used to produce valorised consumer goods. Companies endeavour to develop business strategies which improve survivability through competitive advantage which in turn satisfies human consumption. Competitive forces determining firm profitability[1] are associated with the underlying and technical characteristics of an industry. Strategies which change industry product and process patterns can have the effect of both destroying and improving industry structures. New product designs may secure the short to medium-term profitability of initiating companies but simultaneously undermine the medium to long-term profitability and survival of firms resisting competitive strategy change.

Strategic choices of industry are often based on the immediate returns enjoyed through competitive action without consideration of the longer-term implications of such development. Where companies adopt similar approaches currently enjoyed by one or a few firms the basis upon which enterprise is founded may be impaired or seriously damaged. Hardin's (1968) discussion of the implications of unbridled '*freedom in a commons*' (italics his own) and the restrictions that unqualified self-determination places on longer term freedom in the commons is applicable in relation to the use of raw materials, industrial processes and products (Blunden et al 1978, p. 79).

The three generic competitive strategies identified by Porter, which are employed by firms, are cost leadership, differentiation and focus. A company pursuing a cost leadership strategy aims at ideally being 'the' low-cost producer in its industry. This may include securing economies of scale, proprietary technology or preferential access to raw materials (Porter 1985, p. 12). Differentiation strategies adopted by

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1 Porter (1985) describes these as: (i) Bargaining power of suppliers, (ii) Threat of new market entrants, (iii) Bargaining power of buyers, (iv) Threat of substitute products or services, (v) Rivalry amongst existing firms (Porter 1985, p. 5).

firms focus on securing product uniqueness and responding to customer sensitivity. Where this is achieved the company is rewarded for product exclusivity with a premium price. The advantage of differentiation is that in contrast to cost leadership differentiation has multiple attributes which may attract customer interest. Firms developing cost focus strategies aim at securing cost advantage and a differentiation focus in the targeted market segment. Such a firm will target customers with exclusive or special needs whilst the cost definition of the product aims at winning customers attracted by a cost focus not offered by its competitors (Porter 1985, p. 14). Product diversification has also been identified as a competitive factor along with the nature of product design. The pressure on innovative design functions will vary within industry sectors whilst company response to design change pressures will significantly influence its ability to remain competitive. Important influences on product design include market expertise possessed by a company and customer demand. Companies may also attempt to introduce its products to potential customers earlier in order to gain an increased share of the market as well as higher initial profit margins. Experience with the development of innovative products offers companies the opportunity to secure or acquire technological knowledge and enhance its corporate image (Corsten 1989).

Whilst the pursuit of 'traditional' competitive strategies does not preclude ecological considerations, environmental paradigms such as sustainable development[2] have directly encouraged ecological risk analysis in the exercise of business enterprise and exploration of the impacts of 'environmental crises'. Environmental concerns

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2 Sustainable development (SD) is traditionally defined as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987, p. 8). In economic terms it is expressed through market interventions and regulatory measures designed to correct environmentally-insensitive economic imperatives. The social dimension of SD is concerned with addressing intra-generational equity, poverty and other problems through which the 'North-South divide' is manifest. The environmental, economic and social aspects of SD are implemented at a local level, described as Local Agenda 21 initiatives. In the German version of the 1987 Brundtland Report the term '*dauerhafte Entwicklung*' was used to define 'sustainable development', whilst competing terms such as '*zukunftsfähige Entwicklung*', '*dauerhaft-umweltgerechte Entwicklung*', *Umweltverträglichkeit* and '*Zukunftsfähigkeit*' have also been used to convey the efficiency improvements (*Effizienzrevolution*) and behavioural change (*Suffizienzrevolution*) required to introduce sustainable development. '*Nachhaltigkeit*', a term used in Germany's forestry practices of the 18th century, is a popular translation of SD since its original meaning of 'only felling the number of trees or using wood stock to meet current needs without compromising future requirements' embodies the essence of sustainable practice and aspirations (BUND and Misereor 1996, UBA 1997d).

are linked to scientific and socially defined understandings of the negative impacts that increasing levels of variable residues and waste materials have had on the quality of environmental media (WCED 1987). The pollution assimilation capacity of the air, water and land is described as finite and environmental degradation indicative of the inability of environmental media to accommodate, in certain instances, the waste volumes produced and, in other cases, the nature of waste itself. The conclusions of environmental experts and information presented by state governments such as the UK and Germany illustrate ecological impacts can adversely affect both human health and the environment at large (SRU 1978; UBA 1984, 1997b, 1999; DoE 1988; DETR 1998b, 1999a).

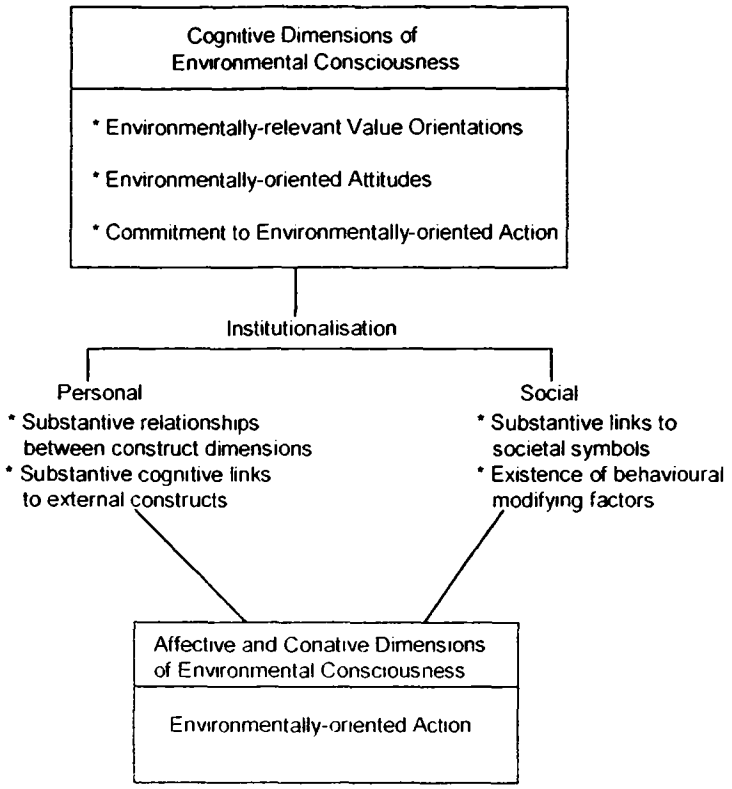
Companies may gravitate towards competitive enterprise approaches without addressing the material or social costs of pollution and waste where conventional environmental regulation through its concentration on pollution control, disposal and waste discharge provides business enterprise little incentive to consider ecological factors (Pearce et al 1989). More recently regulatory and economic instruments have drawn greater attention to the costs of previously unaccounted for and externalised environmental costs with the purpose of directing these costs into the internal cost equations of firm production. Such statutory and regulatory modifications have two important objectives. Firstly they aim at stimulating a re-evaluation of competitive imperatives and corporate costs. Secondly, they are designed to encourage greater consideration of corporate environmental factors in relation to traditional strategic interests such as market analysis, market diversification and investments in product quality, production technology and human resources (European Commission 1994, Porter 1985, Corsten 1989).

A generally held view is that most environmental and ecological damage can be attributed to a small minority of large enterprises, whilst the more numerous smaller companies are held to be environmentally benign in comparison. However, the notion "large enterprise" refers to quantitative characteristics such as employee

number, turnover, sales and production levels. None of these characteristics shed light on the constitution of an enterprise in terms of the spatial dimensions of its operational units, in terms of their number and spatial separation, their location and importantly the potential ecological impacts of these operational units. Company size is not an adequate signal to reflect environmental risk or safety (Tilley 1999). This new understanding of business relations with the environment has sharpened societal demands for revised business practices in all companies (Pearce et al 1989) and increasingly in SMEs, which collectively have tended to escape public attention (BCC 1994). Scientific and technological research aims at quantifying the potential for environmental danger and analysing the extent of such danger. Social science research in its consideration of environmentalism analyses how forms of perceived environmental dangers work through individuals and defined social groups in order to trace the factors central to catalysing or impeding understanding and behavioural change associated with these environmental dangers. Environmental Consciousness is an Anglo-Saxon concept used to describe the study of environmental values and attitudes in relation to environmental behaviour. Research models have been subsequently developed in English and German speaking cultures to define the constituents of this concept. Such models, in both general and specific ways, examine the values, attitudes and actions within defined social spheres which are indicative of the nature of individual or collective commitment to the objectives of sustainable development (Maloney and Ward 1973, Kley and Fietkau 1979, Dunlap and Van Liere 1979, Balderjahn 1986, Schahn and Holzer 1990, UBA 1995, de Haan and Kuckartz 1996). The model used for the purposes of this research is based upon the work of Urban (1986). Urban considered ecological values within the Environmental Consciousness research construct to be relationally embedded structures. Within the construct defined ecological values and environmental commitments are delineated in order identify determinants of environmental behaviour, as is graphically presented in Figure 1.1. The use of a Corporate Environmental Consciousness research model will provide a framework for the consideration of ways in which smaller enterprises

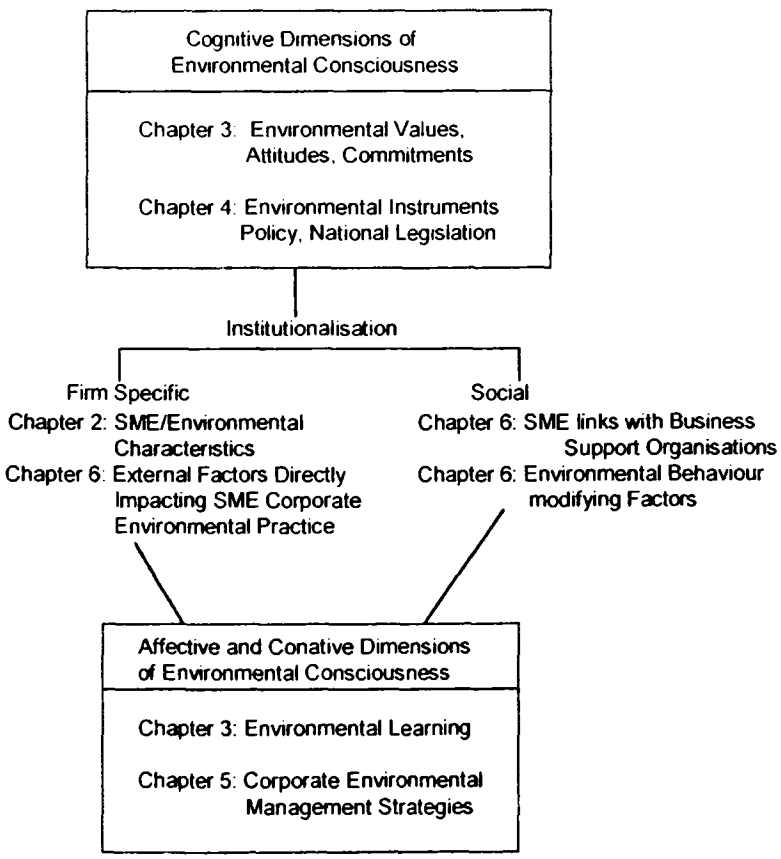
have embraced environmental management practices. These practices interface business enterprise objectives as well as the environmental value shifts prompted by institutions with supervisory and executive influence over corporate enterprise. On the basis of the conceptual origins of the term and employ of Urban's research model this study examines the environmental consciousness of SMEs in the UK and Germany. Accordingly, Chapters Two to Six define the dimensions of the Corporate Environmental Consciousness construct outlined in Figure 1.2, which are considered from UK and German perspectives.

Figure 1.1: The Structure of Environmental Consciousness and its Ecological Dimensions



Source: based on Urban (1986, p. 365 and 373)

Figure 1.2: The Structure of Corporate Environmental Consciousness and its Ecological Dimensions



1.1. Aims and Objectives of Research

The aims and objectives of this research are to:

1. Identify factors peculiar to the operation of small and medium-sized firms in the UK and Germany.
2. Devise a theoretical Corporate Environmental Consciousness Research Model.
3. Apply quantitative and qualitative research methods to the examination of corporate environmental consciousness in the UK and Germany.
4. Examine the legislative basis of environmental activity in the UK and Germany.
5. Identify the requirements of the Eco Management and Audit Scheme and ISO 14001 Management Systems.
6. Employ the Corporate Environmental Consciousness Research Model to investigate socio-economic factors which promote and impede corporate environmental management in SMEs.
7. Present and analyse research results.
8. Provide an understanding of the interrelations between corporate environmental values, environmental attitudes and environmental practice in the United Kingdom and Germany through the realisation of the above aims.
9. Provide a research model through which corporate environmentalism can be investigated.

1.2 Outline of Thesis

Chapter Two explores the SME construct in relation to its economic and environmental significance. Chapter Three defines the term environmental consciousness and contextualises the notion of corporate environmental consciousness discussed in Chapters Four to Six. Chapter Four examines the corporate values underpinning firm operations in the UK and Germany. Chapter Five considers environmental management in relation to the corporate values, aspirations and commitments discussed in Chapters Three and Four. Chapter Six highlights key influences on the formation of environmental consciousness in the UK and Germany, in addition to the particular impacts of these influences on

smaller firms. Chapter Seven identifies the methodologies employed in the Corporate Environmental Consciousness research model and presents the research dataset. Chapter Eight records and analyses the empirical results whilst Chapter Nine concludes with a research review and research recommendations.

2 DEFINING SMES

2.1 Definition of Company Size

The term 'small and medium-sized enterprise' (SME), described as '*kleine und mittlere Unternehmen*' (KMU)[3] in the German language, share common theoretical dimensions. Both are company size classifications through which the anticipated economic activity of firms can be understood and categorised. Typical small and large enterprise characteristics are listed in Table 2.1, which generally describes many of the challenges facing SMEs and forms the basis of discussion in this Chapter. An all-embracing consideration of diverse characteristics describing company size, which are qualified by the complex of sub-characteristics included in Table 2.1 is neither an easy task nor purposeful in practice. In practice the subjective nature of the SME definition in both UK and German settings renders it vulnerable to conceptual criticism and revision[4]. Since there is no uniform measurement of company size, research postulates determine which particular features of an enterprise are considered to be appropriate for analysis.

Company size definitions have financial and legal implications. Small and medium sized firms in the UK and Germany benefit from exemptions on accounting and auditing information in conformance with company law and statistical requirements. In the UK Small enterprises need only provide an abbreviated balance sheet and notes, plus a special auditor's report. Medium sized enterprises provide a full balance sheet, an abbreviated profit and loss account, a special auditor's report, a director's report and notes to the accounts[5].

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3 Also described in the German language as '*kleine und mittlere Betriebe*'. Since the terms SME and *KMU* are interchangeable, reference to 'SMEs' in this study will also refer to *KMU*, unless otherwise stated.

4 The Bolton Committee defined a 'small business' as one which was personally managed or partly managed by its owners without a formal management structure, but equally defined a small business as one consisting of up to 199 employees. However, research (Curran (1986); Stanworth and Gray (1991); Atkinson and Storey (1994); Storey (1994)) would suggest that formal management functions and personnel are likely to be introduced to enterprises numbering 10 employees and above. Businesses with 50 employees will have strong management team and decision making competencies. A company with 100 employees is likely to have undergone a devolvement of decision making process, involving not only management but supervisors, etc, in whom considerable responsibility will have been invested. Similar issues concerning German SME definitions and revisions are discussed and illustrated in Koch (1982), Lücke (1982) and BMWi (1997).

5 Section 249A(3) of the Company Act 1985 provides for an exemption in a financial year for companies that qualify as small company in relation to that year for the purposes of 247, have a

Table 2.1: General Characteristics of Small and Large Enterprises

	Small Enterprise	Large Enterprise
Organisation	Organisation controlled by a single entrepreneur or few managers. Few departments. Short direct information channels. Limited sphere of delegation.	Complex organisation structure focusing on individual operational functionality. Extensive departmentalisation. Prescribed information channels. Delegation in many areas.
Management	Often lack of bureaucracy and limited planning. Greater importance placed on improvisation and intuition. Company success often linked to dynamic, entrepreneurial managers who react quickly to take advantage of new opportunities which may involve risks. Capacity overload resulting from diverse functional responsibility. Poor judgement may offer less manoeuvring and recovery options.	Professional managers able to control complex organisations and to establish corporate strategies. Less importance placed on improvisation and intuition. Can suffer an excess of bureaucracy. Often controlled by accountants who can be averse to risk. Managers can become mere 'administrators' who lack dynamism with respect to new long-term opportunities. Absolute and relevant division of labour. Poor judgement offers more manoeuvring and recovery options.
Internal Communication	Efficient and informal internal communication networks. Affords a fast response to internal problem-solving: provides ability to reorganise rapidly to adapt to change in the market.	Internal communications often cumbersome: this can lead to slow reaction to external threats and opportunities.
Research and Development	Often unable to support and invest in long-term and formal R&D. Often demand-driven product development; no pure research. Relatively short period of time between invention and economic utilisation.	Can support and invest in the establishment of a long-term R&D. Product development in close relation with pure research. Relatively long period of time between invention and economic utilisation.
External Communication	Often lack the time or resources to identify and use important external sources of scientific/technological expertise.	Able to 'plug in' to external sources of scientific and technological expertise. Can afford library and information services. Can subcontract R&D to specialist centres of expertise. Can buy crucial technical information and technology.

turnover in the same year of no more than £350,000 and have a balance sheet total in that year that is no more than £1.4 million. According to Section 247 of the Companies Act (1985) a small company is one which satisfies two of the following criteria: a turnover of up to £2.8 million, a balance sheet total of up to £1.4 million and does not exceed 50 employees. A medium-sized company is one which has a turnover of up to £11.2 million, a balance sheet total of up to £5.6 million and does not exceed 250 employees.

Table 2.1: General Characteristics of Small and Large Enterprises (ctd.)

	Small Enterprise	Large Enterprise
Finance	Limited access Can experience great difficulty in attracting capital, especially risk capital. Innovation can represent a Disproportionately large financial risk.	Wider access Ability to borrow on capital market. Ability to spread risk over a portfolio of projects. Better able to fund diversification into new technologies and new markets.
Economies of scale	In some areas scale economies form substantial entry barriers to small firms. Inability to offer integrated product lines or systems.	Ability to gain scale economies in R&D, production and marketing. Ability to offer a range of complementary products. Ability to bid for large turnkey projects.
Growth	Can experience difficulty in acquiring external capital necessary for rapid growth. Entrepreneurial managers sometimes unable to cope with increasingly complex organisations.	Ability to finance expansion of product base. Ability to fund growth via diversification and acquisition.
Production	Work-intensive. Little division of labour. Less cost reduction as production levels increase.	Capital-intensive. High division of labour. Higher cost reduction as production levels increase.
Marketing	Ability to react quickly to keep abreast of fast changing requirements coupled with an inadequate information base to utilise existing flexibility advantages.	Comprehensive distribution and servicing facilities. High degree of market power with existing products coupled with an elaborate and formal information base.
Government Regulations	Often experience difficulties with complex regulations. Unit costs of compliance for small firms often high.	Ability to fund legal services to cope with complex regulatory requirements. Can spread regulatory costs. Able to fund R&D necessary for compliance.

The corresponding small and medium-sized German firm classifications are primarily used by German share holding or public limited companies for the production and publication of annual accounts[6]. A more often used company size definition embracing small and medium enterprises in the German-speaking world is that of the *Mittelstand.* Small and medium sized firms here defined are considered to be those which have an employee number of up to 500 and a yearly

6 Both the German Commercial Code (*Handelsgesetzbuch, HGB*) and the Shareholder Law (*Aktiengesetz* (*AktG*)) specify legislation governing public limited companies in Germany, accounting practice and indirectly by taxation law. Although the *HGB* and the *AktG* outline the regulations and distinctions between small, medium and large incorporated companies, the accounting methods are generally the same throughout company size classifications. According to the *HGB* concessions are made for non-incorporated companies in terms of layout (§§266-7), auditing (§316), and disclosure (§§326-7), but actual accounting and auditing information required is very similar, as defined in the Company Act 1985. A small firm is defined as one having satisfying two of the following criteria: a turnover of up to 8 million DM, a balance sheet of 3.9 million DM and not exceeding 50 employees, whilst a medium-sized firm has a turnover no greater than 32 million DM, a balance sheet of up to 15.5 million DM, and not exceeding 250 employees. Refer also to the *Bürgerliches Gesetzbuch* and the *Gesellschaft mit beschränkter Haftung Gesetz* for additional details on German SME structures.

turnover of up to 100 Million DM[7]. The significance of the term *Mittelstand* will be considered in Chapter Six.

The increasing convergence of social and economic legislation and policies secured by the European Union has had a profound collective effect on the industrial practices of EU Member States, including attitudes towards small business enterprise. The term 'Small and Medium-sized Enterprise[8]' is foremost a construct of the European Commission used in the collection, processing and analysis of data on companies primarily within the European Union and Western Europe[9]. Since the late 1970s there has been a reappraisal of the importance of the role of new enterprises as a source of job creation and wealth; this has engendered policy formation aimed at improving the conditions in which new enterprises can develop and become established. Data collected on businesses throughout Europe facilitate an understanding of enterprise and policy interrelations, which in turn influences the strategies employed to develop enterprise. Company size definitions are important as markers of financial support available from European Union funding sources. Prior to 1996 SMEs were described as those companies with no more than 500 employees per enterprise, an annual turnover of less than or equal to 38 million ECU where no more than one third of the enterprise capital was under the control of one or other companies, which were not SMEs themselves (European Commission 1995a). Since the recommendation of 3 April 1996 the European Commission has classified SMEs to be those enterprises satisfying the criteria in Table 2.2:

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7 The principles of the German company size framework were drawn from the American Small Business Act (SBA) of 1953. The cut-off point for a small company was an employee number between 49 - 99, exceptionally 199. A medium-sized company was generally described as having less than 500 employees, whilst large companies would employ more than 500 workers. Other factors considered included company energy costs, wage and capital costs, company costs, productivity, access to capital markets, investment capital level, net production value, company balance. For a more detailed discussion refer to Lossen, H. (1959), (1960); Statistisches Bundesamt (1995), Bundesministerium für Wirtschaft (1993), Bussiek (1996), Kießling (1996).

8 Compare Council Regulation (EEC) No 696/93 of 15 March 1993 (OJ L 76, 30.3.1993, p. 1 and Council Regulation (EEC) No 2186/93 of 22 July 1993 (OJ L 196, 5.8.1993, p. 1) Eurostat (eds) (1998). Also Zeitel (1990), p. 26-29; Fritsch (1993), p. 39-48.

9 Council Regulation (EEC) No 696/93 of 15 March 1993 (OJ L 76, 30.3.1993, p. 1); refer also to Section 6.1.2.1 on the *Mittelstand* where the early usage of the term is discussed.

Table 2.2: European Commission SME Definition

	Micro	Small	Medium
Turnover	Not Applicable	< = 7 mill. ECU	< = 40 mill. ECU
Balance Sheet	Not Applicable	< = 5 mill. ECU	< = 27 mill. ECU
Employees	maximum 10	maximum 50	maximum 250
Independence Criteria	Not Applicable	25%	25%

Source: European Commission Recommendation No 96/280/EC

The European Commission defines an 'enterprise' as an organisational unit comprising a combination of legal units that produces goods and services and operates with sufficient autonomy for the purposes of decision-making and allocating its resources (Eurostat 1998). A 'local unit' is either an enterprise or a part of an enterprise located in a geographically identifiable place, whilst an 'enterprise group' comprises enterprises connected by financial and legal association. 'Independence criteria' refer to the maximum percentage of an enterprise that may be singularly or jointly owned by several enterprises not satisfying the same criteria.

2.2 The Economic Significance of SMEs

The Bolton Committee Report on small firms (1971) is often referred to within the context of UK small business enterprise primarily because it articulates the challenges faced by firms, the measures required to maintain their business health and provided added impetus for the formulation of 'modern' small business policy in the UK. Bolton stressed that if small companies are to play an effective role in the market economy their operating spheres should afford them the opportunity to survive. One of the key features of the small firm sector is described as providing a seedbed for enterprise and innovation, which in turn would stimulate national economic growth. In both Germany and the UK SMEs constitute a significant portion of the production and provision of goods and services. They are important as suppliers to large enterprise and stimulate competition. The most successful SMEs are renowned for their ability to be innovative and flexible (Storey (1994), p. 308, 309; Mugler (1995) and Pleitner (1995)). These abilities can be attributed to short information or communication paths and concentrated decision making

authority in one person, described as a prerequisite for swift adaptation to changing market conditions and requirements. SMEs are also of considerable importance as creators of employment and a source of qualified employees (Gallagher and Stewart 1984, European Commission 1995a, European Commission 1995b, European Commission 1997, EPFS 1999a). The innovative prowess of smaller companies can lead to process yields and productivity resource gains (Porter and van der Linde 1995) as well as a greater variety of products and services available to consumers. Where SME distribution is spatially even they are also able to cushion microeconomic tensions resulting from economic change through increased employment uptake and firm formation, therefore serving the interests of social stability[10].

In contrast to large enterprises, SMEs in the UK and Germany are described as having limited possibilities to maintain investment activities over long periods (Storey 1994, pp. 215-219; BMWi 1997, pp 204,205). Extra capital may be required at short notice in view of new developments in the market or the demands placed on a smaller company by one of its customers. The discontinuity in investment behaviour can be attributed to a lack of financial possibilities, which before, or after receipt of capital investment may involve a long period of saving or financial consolidation. Financial management behaviour in SMEs may also directly contribute to uneven investment patterns. In the absence of strategically focussed financial and investment planning SME owners are forced into spontaneous decision-making and requests for larger sums of finance in an attempt to deal with previously unaddressed investment concerns. Growth patterns of SMEs are distorted where they have limited access to capital markets and carry comparatively high capital and interest rate costs. The burden of higher capital costs faced by SMEs is also a consequence of barriers to entering international capital markets; larger companies have access to these financial facilities and

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[10] Compare the Commission of the European Communities (eds.) (1990), p. 1-2; BMBF/*BMWi* (eds.) (1997), p. 11-14.

benefit from the more favourable conditions on which they are offered (Storey 1994, BMWi 1997).

2.3 SMEs and the Environment

Revised understandings of the relation between social production and environmental degradation have encouraged measures aimed at reducing the material or social costs of pollution and waste. Whilst environmental concern has traditionally centred around the activities of larger enterprises the adverse environmental impacts of smaller firms have increasingly attracted research attention (Pinter 1984, Beer and Troge 1989, Hutchinson and Chaston 1994, Shayler 1996, Bayliss et al 1998). In quantitative terms smaller enterprises outnumber larger firms in most advanced industrial economies (BMWi 1996, Eurostat 1998, DTI 1999) and are responsible for over 50% of the pollution produced by industry (Groundwork 1995, BMWi 1997). Although single SMEs are unlikely to generate the negative environmental impacts associated with larger enterprises the air emissions, noise, effluent, waste and pollution released by smaller firms are qualitatively significant, especially where they are in close proximity to or within residential areas (Waskow 1994, p. 73, UBA 1994, p. 69).

Existing research conducted on small firms in the UK suggest that there is a significant gap between the environmental attitudes and behaviour of smaller firms, whereby expressed environmental concerns or environmentally-related aspirations of manager-owners tend not to be mirrored by actual environmental commitment (Holland and Gibbon 1997, Tilley 1999). German research on environmental attitudes and behaviour has equally identified inconsistent patterns arising from cognitive and conative instances (Diekmann and Preisendörfer 1992, Schahn 1993, Bamberg 1994, UBA 1995). This inconsistency has been linked to the inability of smaller firms in particular to translate environmental ideals into objective and quantifiable corporate action as well as the belief that their activities do not warrant additional environmental management (Strößenreuther 1997, Bowen 1998).

Comparatively low importance attached to enhancing environmental activities expressed by smaller firms in surveys investigating priority corporate concerns and goals is equally suggestive of a limited commitment to environmental management (IoD 1995, Gerling Consulting 1995, KPMG 1997, Seidel and Weber 1998, Groundwork 1998).

The detached stance towards environmental matters on the part of SMEs is described as being related to the fact that many traditional environmental regulations have neither specifically affected small firm enterprise nor generally prompted environmental modernisation. Factors cited as contributing to corporate environmental modernisation include enhanced environmental learning opportunities through improved business support and institutional infrastructures, the promotion of ecological investment through the removal of financial or economic barriers and increased product responsibility (Beer and Troge 1992, Welford 1994, BCC 1994, BUND und Misereor 1996, Schmid 1997, ETBPP 1998a). The introduction of market and regulation-driven environmental change poses particular challenges to SMEs. On one hand it is anticipated that the improvisatory and dynamic characteristics associated with smaller enterprises will be employed to enable SMEs to take advantage of burgeoning environmental market opportunities (Stefan 1995, Porter and van der Linde 1995). On the other hand increased environmental sustainability measures serve to internalise the material, economic and social costs of competitive enterprise. Consequently smaller firms may perceive environmental spending as a threat to their competitive prowess or survival, with the net effect of job loss (UBA 1994, BDI 1998, Beardsley 2001).

Increases in regulation density are resisted by smaller firms since they tend to lack the human capital required to reduce the unit costs of compliance (IoD 1997, BDI 1999)[11]. However, research findings and experiences associated with the impact

[11] Refer to Clemens et al (1995) for details of in depth research outlining German company

of increased environmental protection on corporate attitudes, employment and job creation in the old and new German *Länder* are not fully supportive of the sentiments of SMEs which oppose environmental change on the grounds of job loss. It is argued that increased environmental protection heightens legal security and the domestic demand for cleaner technology, which in turn encourages the growth of environmental export markets (UBA 1997c). Importantly previous research indicates that domestic environmental imperatives such as higher abatement costs are not key considerations for German companies desiring to invest or relocate abroad (UBA 1993a)[12]. Assessing the relation between job creation and loss as a consequence of environmental protection measures is a challenging exercise since environmental labour market analysis involves accounting for: (i) the number of individuals who are directly and indirectly employed in environmental protection activities, and (ii) the net impact of environmental policy on the labour market balance in terms of the additional jobs created (DIW 1997). Although studies estimating existing and future labour market effects do not use uniform category definitions each suggest the overall effect of environmental protection on employment is positive rather than negative for SMEs and larger enterprises[13]. Another important consequence of increased

compliance costs associated with labour and welfare, taxation and employee contribution duties, statistics and environmental protection. Sizeable increases in compliance costs were detailed as a symptom of increases in the number of laws, ordinances and directives in addition to the shorter intervals between modifications made to legislation. The increased diversity of governmental documentation was identified as posing particular problems for smaller enterprises, whilst larger companies were more affected by the complexity and frequency of regulatory responsibilities. Refer also to a study produced by Klein-Blenkers (1982), which used similar investigative approaches. Ongoing surveys conducted by the Small Business Research Trust provide some insight into the cost of VAT compliance for UK firms (SBRT 1998, 1999).

12 Key location factors were described as proximity to customers, potential market growth, the price and access to raw materials, existing infrastructure, product links, quality of the work-force and wage levels, energy costs, taxation levels, political stability and the socio-political climate. Reducing environmental protection levels was not considered to be as important as the aforementioned factors (UBA 1993a).

13 The UBA (1993b, 1993c) estimates that 680,000 jobs were employed in the environmental protection industry in 1990 (206,000 in pollution control and 341,000 in environmental protection manufacturing in Western Germany; 46,000 in pollution control, 28,000 in environmental protection manufacturing and 60,000 in environment-related job schemes (*Umwelt-ABM*) in Eastern Germany). In the year 2000 it was estimated that 786,000 environmental jobs were created in Western Germany and 336,000 in Eastern Germany). In another study by DIW, IFO, IWH, RWI (1996) the gross impact of environmental protection on employment was estimated at 950,000 positions, representing 2.7% of the total labour force in West Germany and 4.7% in East Germany (DIW 1997, p. 10). ENDS (1992) reported that the number of environmental consultancies in the UK had risen from 149 in 1985 to 339 in 1992, whilst the number of UK professionals employed full-time on environmental contracts rose from 3846 in 1990 to 6477 in 1992. Comparable national statistical reports or surveys do not currently exist for the UK as a whole although primary regional assessments have been produced (ECOTEC 2000, ERM, NWRA, NWRDA, GONW and Partners 2000, SQW and LUC 2000). In each of the UK regions identified the total employment for the regional environmental sector lies between 32,000 - 40,000. Statistics on the total environmental

environmental engagement is the requirement for skilled staff. Research and experience to date would also suggest that the provision of effective environmental training and education has a positive quantitative and qualitative effect on the stock of jobs within and without the environmental protection sector (UBA 1993b, 1993c, 1993d, Hale 1996, UBA 1998a).

Increasing public awareness of environmental dangers and risks through general and specialist media influences individual and corporate action. Companies strategically engage in defined activities in response to evolving environmental conventions which are perceived to satisfy business objectives. Strategic environmental protection involves the consideration of business activities that positively or negatively impact the physical environment and which secure competitive advantage (Welford and Gouldson 1993, Hoffmann and Röhr 1997). Commitment to environmental management systems and their elements discussed in Chapter Five is associated with competitive advantage potentials. Such potential ensues from a range of corporate developments including the effective control of often complex material or energy flows as well as identification of relevant legislation or regulatory requirements in order to avoid legal liability (SRU 1994, UBA 1994, Department of the Environment 1995a, BSI 1996a, UNI and ASU 1997). EMS implementation is also associated with resource and cost savings (BUNR and UBA 1996, DETR 1997b) in addition to improved technical prowess as a consequence of the attention given to more environmentally-sensitive processes or products which may reflect changing stakeholder and customer requirements (Sietz 1994b, Robinson and Clegg 1998). Therefore, companies are able to maintain their market position, improve their company image and increase staff motivation through measures which aim at satisfying stakeholder and customer demands and

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sector workforce in the London region are due to be published by the London Development Agency in 2001. For more details on German job creation through the environmental industry refer to Bundesumweltministerium (ed) (1996): '*Aktualisierte Berechnung der umweltschutz-induzierten Beschäftigung in Deutschland*' and J. Blazejczak and D. Edler (1997): '*Tendenzen der umweltschutzinduzierten Beschäftigung in Deutschland*'. Wochenbericht 9/97. Deutsches Institut für Wirtschaftsforschung (DIW), 64, pp. 157-162, Berlin. For further details on UK employment in the environmental sector contact S. Chubb at the Greenwich Environmental Management Services (GEMS), London.

benefit from company-wide learning strategies (Steger 1992, Fichter 1998, Goodchild 2000).

Although in comparative terms many UK and German firms use environmental management systems, research examining the nature of EMS ownership identifies SMEs with significantly lower implementation levels of certified or verified systems than larger enterprises and lower commitment to measures aimed at systematic environmental control (UBA 1994, Groundwork Foundation 1995, IEM 1998a). The lack of systematic environmental management on the part of SMEs has been linked to a range of factors. Some authors indicate that the limited environmental knowledge base in SMEs prevents these firms from recognising the gravity of their impacts or the scope their activities afford in terms of energy efficiency and pollution or waste control (Hutchinson and Hutchinson 1995, Ensthaler et al 1996, O'Laoire and Welford 1996, DETR 1997b). As a result environmental management system elements such as the Environmental Review, Environmental Auditing or an Environmental Statement may pose both conceptual and technical challenges even to firms, which have considered aspects of pollution and waste in their Environmental Policies (Barrett and Murphy 1995, UNI and ASU 1997, Hartmann 1998). Other authors have suggested inadequate legislative stimulus reduces the relevance of corporate environmentalism for most SMEs (Ankele 1998, Bayliss et al 1998) whilst the financial outlay associated with certified or verified EMS implementation serves to discourage SMEs from developing risk management skills beyond the boundaries of health and safety (Klemisch 1997, Kottmann 1998, Smith, Kemp and Duff 1998, Hempfling 1994, SFEDI 1998). These concerns have given rise to calls for a 'deregulated' or simplified EMS structure, which reflects the experiences of SMEs. Anticipating future increases in EMS ownership by SMEs some researchers have pointed to the increased implementation rates of quality management systems by smaller firms over time. Two important factors prompting ownership of certified quality management systems were firstly, heightened appreciation of the efficiencies of scale and scope that can be derived from quality

management and secondly, certified QMS ownership provided market entry leverage. Experience with quality management systems is also described by some authors as providing a useful basis for EMS development (Borri and Boccaletti 1995, Schwerdtle and Bräunlein 1996, IEM 1998b). Consequently it is argued that SME uptake of the EMS is a supply chain management issue where, for example, suppliers, in response to more environmentally-conscious specifications of their customers, introduce certified or verified environmental management systems to underscore their environmental market credentials (Gege and Nehm 1998, IEM 1998a, Enseling 2001, Bayliss et al 1998, McGee and Bhushan 1993, Lamming and Hampson 1996, Welford et al 1998, ENDS 2001b).

3 ENVIRONMENTAL CONSCIOUSNESS AS AN OBJECT OF RESEARCH

The aim of Chapter Three is to trace the origins of and define the term Environmental Consciousness which will be used in this study as a theoretical construct for the assessment of corporate environmental management in UK and German SMEs.

3.1 Formulating Environmental Consciousness

'Environmental consciousness' is the term given to the study of environmental values and attitudes in relation to the analysis of their social formation and commitment to positive forms of ecological behaviour. The German translation of this expression, '*Umweltbewußtsein*', became closely associated with the growing social insights into the dangers posed by human endeavours on natural resources as well as the preparedness to avert negative environmental impacts. Attention paid to these themes has led to a reappraisal of environmental values and an attitudinal change towards the control of environmental risk (UBA 1995). The origins of *Umweltbewußtsein* as an empirical construct are rooted in research on environmental value and attitude measurement conducted by social scientists such as Maloney and Ward (1973). Despite its Anglo-Saxon heritage 'environmental consciousness' is not a term commonly used in the UK, and as a construct for empirical research remains largely underdeveloped[14] although its thematic content and relevance has been an integral part of environmental thought for some time (Hardin 1968; Mabey 1980; WCED 1987; Sagoff 1988) and the basis of environmental research during the 1990s (Crane 1995; Bayliss et al 1998; Petts et al 1999).

Umweltbewußtsein has been mistakenly construed as a device for attitudinal measurement (UBA 1995, p. 14). Although the construct variable 'environmental attitude' plays an important part in the environmental consciousness construct,

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[14] A recent example of its use was provided by Bohlen (1994) in a PhD thesis which investigated the environmental consciousness of UK consumers with respect to consumer knowledge, attitudes and behaviour.

attitudinal evaluation has been essentially limited to understandings of 'high' and 'low' levels of environmental consciousness derived from variable measurement scales. These analyses make no reference to the multilayered influences on environmental consciousness which contribute to its crystallisation and reformation.

3.2 Defining Environmental Consciousness as an Empirical Construct

Environmental consciousness is concerned with the relationship between values, attitudes, commitment and action in the context of positive environmental engagements and factors which impede such behaviour. The environmental consciousness construct also aims at contextualising unanticipated impacts of applied industrial measures within social systems, of which environmental policy forms a part. A model suited to the examination of environmental values, attitudes, commitment and action has been developed by Urban (1986), represented in Figure 1.1. Two factors distinguish this model from many preceding and succeeding it, namely the inclusion of affective and conative contingents and the impact of personal and social institutionalisation. The importance of these additional insights when exploring environmental values and attitudes for empirical measurements forms part of the discussion on environmental consciousness below.

3.2.1 Environmental Values

The concept of value has been ascribed a range of meanings and definitions. The *Oxford Concise Dictionary* describes value as 'the worth, desirability, or utility of a thing, or the qualities of; worth as estimated...', evoking both qualitative and quantitative understandings. One of the most common definitions of values within the field of social sciences is that formulated by Rokeach (1973). He defined values as continuous beliefs "where a certain type of behaviour or lifestyle in view of personal or social reasons is preferred to an opposing or different lifestyle" (p. 5). In support of this definition Rokeach differentiated between instrumental and object oriented values. Instrumental values orientate themselves by the way the goals are

obtained and the employed means to reach these goals whilst object values quantify the goals[15]. The first of three significant cognitive dimensions of environmental consciousness identified by Urban (1986) equally draw on Rokeach's notion of value orientations, which he describes as '*umweltrelevante Wertorientierungen*' (environmentally relevant value orientations). Environmental values are defined as being expressed through the orientations of defined environmental objectives and the nature of the supporting measures employed to achieve defined environmental objectives. Environmentally-relevant value orientations are described as general value or judgement systems for all objects of attitude. Such orientations have the capacity to frame or convey meaning to objects (*Sinngebungsmuster*) with which individuals integrate their respective, field-specific attitudes and formulate worldviews[16].

Related to the concept of environmental value is that of environmental risk. Environmental risk management is concerned with the control of (un)acceptable tolerances or measurements in environmental quality experienced by objects of value. Matten (1995) describes environmental risk as comprising ecological and economic aspects. As such environmental risk comprises a potential emission with potential economic consequences and can also be seen as a potential economic consequence of an actual ecological breach or emission (Matten 1995, p. 108). In the context of SMEs 'risk' and 'hazard' are primarily associated with health and safety practices aimed at securing the health, safety and welfare of individuals at work or persons who may be endangered by work activities. Health and safety or environmental risk can also be defined as the product of the probability of harm arising and the degree of danger, expressed as:

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15 These are subdivided into 18 instrumental and object oriented values within a hierarchical value frame. For further details refer to Rokeach (1973).

16 Urban (1986) p. 365.

Risk = Probability x Degree of Hazard, where

Probability = Probability of harm
Degree of Hazard = Scale of harm (ie, finances, mortalities, injuries)

In this case 'hazard' refers to any situation or object that can cause harm as defined by specific health and safety or environmental legislation[17]. Environmental risk factors refer to those issues and developments which can impede the success or survival prospects of corporate enterprise. Company risk weightings may emphasise, for example, business profitability, a process focus or a product focus as defined by company goals and perceptions of risk. Douglas and Wildavsky (1982) indicate that responses to risks are often embedded in tacit differences in assumptions about social factors which shape both the scientific and social consensus (Douglas and Wildavsky 1982)[18].

It is argued in this thesis that on an institutional level values and value orientations are primarily defined by operating regulations and principles. Regulation and regulatory principles can be understood as expressions which represent and describe the historical narratives and goals of a nation state. Environmental regulations and the principles upon which they are based normatively frame environmental debate and key meanings assigned to issues or activities in public environmental debate. Institutional values can also be identified in terms of how nation states internalise exogenous values.

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17 For example, the Control of Substances Hazardous to Health Regulations (1999) (COSHH), the *Gefahrstoffverordnung (GefStoffV)* and the *Chemikalienverbotsverordnung (ChemVerbotsV)* apply to all "very toxic, toxic, harmful, corrosive or irritant" substances (defined in the Chemicals (Hazard Information and Packaging for Supply) Regulations (1994)/*Gefahrgutverordnungen (GGV)* and *Verordnung über die Mitteilungspflichten nach § 16 Chemikaliengesetzes zur Vorbeugung und Informationen bei Vergiftungen*) and to all places of work. Hazardous substances refer to gases, vapours, liquids, fumes, dusts and solids. COSHH and corresponding German legislation cited include substances which have chronic or delayed effects (ie, substances which are carcinogenic, mutagenic or teratogenic) also addressed by EU environmental Directives such as 90/313/EEC. In the UK firms with more than 5 employees are legally obliged to formulate a Health and Safety Policy (Health and Safety at Work Act, Part II, Section 3) in addition to provide risk assessment and analysis documentation, specifically for lead (Management of Health and Safety at Work Regulations (1999)). German legislation determines that firms with more than 10 employees are required to produce risk assessment and analysis documentation of all potential work hazards, including, contributory factors to hazards such as employee training levels, employee competence and technology changes (*Arbeitschutzgesetz §5(1)* and *§6(1)*.

18 In the analysis of pollution risk Douglas and Wildavsky considered both its technical and social aspects as being rooted in notions of adulteration and different societal measures for dealing with this state. So when "... we speak of river or air pollution ... the physical adulteration of an earlier state can be precisely measured. The technical sense rests upon a clear notion of the prepolluted condition ... [The] non technical idea of pollution is particularly useful in political argument because it carries the idea of moral defect ... Generally, pollution ideas are the product of an ongoing political debate about the ideal society" (p. 36).

3.2.2 Environmental Attitudes

Values operate on a more abstract level of consciousness than attitudes in that they are the social 'virtues' to which subjects aspire. The normative character of values determines that they represent what may be vocalised during and about situations and not necessarily what is done in situations where these values should be operating. Attitudes are seen to exhibit cognitive and conative responses rooted in value orientations. Fishbein and Ajzen describe affection as the central notion in the concept of attitude (Fishbein and Ajzen 1975, p. 11) where individuals are inclined to consistently respond in a positive or negative manner under certain circumstances:

'...attitude can be described as a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object' (Fishbein and Ajzen 1975, p. 6).

Similarly Rokeach defines attitudes as evaluative beliefs relating to an object or situation which predisposes an individual to respond in a particular manner, but where Fishbein and Ajzen emphasise affection as underpinning attitude, Rokeach holds the view that evaluative beliefs prompt attitudinal behaviour, '... wherein the object of belief is judged to be good or bad...' (Rokeach 1973, p. 7). Essentially attitudes are held to mediate between espoused values and actual behaviour. Urban's (1986) second dimension '*umweltbezogene Einstellungen*' (environmentally-related attitudes) embraces both the significance of evaluative predispositions and the role that espoused values may play in the formulation of attitudes[19]. The affective aspects of environmentally-relevant attitudes enhance their conceptual use in the analysis of cognition. Attitudinal relations are defined through emotions (eg, the negative perceptions associated with nuclear energy technology) from which emanate socially normative, or behaviour regulating influences. Another important influence on environmental attitude is the media. In Urban's environmental consciousness model media influence is identified as an

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[19] *"[Umweltbezogene Einstellungen] ... sind handlungsnäher, gegenstandsspezifischer und schwächer institutionalisiert als Wertorientierungen... Einstellungen schaffen eine emotionale Besetzheit ihrer Objekte...., von denen eine große sozial-normative d.h. verhaltensregulierende Kraft ausgehen kann".* Urban (1986), p. 365.

example of personal and social institutionalisation, a theme which is pursued more extensively in Chapter Six. Downs (1972) introduced the notion of a five-staged "Issue-Attention-Cycle"[20] to describe how the media select topics for debate which capture the attention, concern and fears of the general public. Similarly, Murch (1974) concluded that reaction to social phenomena such as environmental pollution progresses through the following stages: the simple awareness of objective conditions; the definition of these conditions as a 'problem'; beliefs about the causes and solutions to the problem; personal commitment to solving the problem; problem solving action. Both Downs (1972) and Murch (1974) contend that environmental consciousness involves the visualisation of ecological problems, knowledge-acquisition and reflection, which results in the formation of attitudes and environmental response. This is the position held by Sears (1980) who argues that individuals essentially become concerned with issues when an external force impinges on their personal circumstances whilst Kinder and Kiewit (1981) suggest individuals invariably incorporate the national vision in their formulation of issue opinions. Research by Heberlein (1981) and Rohrschneider (1988) also suggests most experience of environmental degradation is formulated through the attitude informing media and not rooted in personal experience. Environmental consciousness is perceived to be only marginally influenced by the level of negative impacts on environmental quality experienced in the immediate locality. These research findings complement the conclusions of Kasperson et al (2000) who suggest attitudes towards technology and technological developments as either agents of environmental improvement or the cause of environmental problems are in fact responses to the social amplification of risk. It is argued that the interaction between risk events and social processes assume meaning through intensifying or

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[20] The first stage is described as the 'pre-problem stage', marked by the existence of an undesirable social condition which occupies the attention of some experts or interest groups, but not that of the general public. The stage of 'alarmed discovery and euphoric enthusiasm' is provoked by a dramatic event or awareness and the desire to address the problem. The following stage is described as "realising the cost of significant progress", during which time understanding of problem dynamics become more widespread and the implications of change become apparent. The fourth phase "decline of intense public interest" is in part the response of the media to the issue at hand and also due to public boredom, disinterest or the fact that resolutions have been set in motion. The fifth 'post-problem' stage is shaped by and shapes public understanding of the issue and is substituted by the media by other concerns. Experience of the issue will determine how subsequent related concerns enter the public sphere by the media and social actors or how the same issue re-enters public debate (Downs 1972, p. 39,40).

weakening signals that are part of the information individuals and social groups receive concerning risk. Equally the information system, which may be one of many social institutions, filters signals in particular ways with respect to the attributes of defined risks and their importance within defined communities (Kasperson et al 2000, p. 237).

3.2.3 Values, Attitudes and Postmaterialism

The examination of environmental values and environmental attitudes in the social sciences is linked to the assumption that their operation will translate into actual behavioural change (Maloney and Ward 1973, Rokeach 1973, Fishbein and Ajzen 1975). 'High' environmental consciousness expressed through (national) populations is generally considered to imply a diffusion of positive environmental convictions throughout public life with corresponding political and socio-economic change. This thesis, it is here argued, contributes to the misalignment of environmental values-attitudes-behaviour relations. A difficulty encountered by empirical research devoted to individual potentials and aspirations is the uniform identification of environmental values. Subsequent assessment of cognitive and conative judgements rooted in environmental attitudes is in part dependent upon the defined concept of environmental values. It is argued here that 'commonly shared environmental values and standards' objectively prescribe the operations, functions and rationales of business enterprise to an extent not typically experienced at the level of the individual outside of corporate parameters. The range of engagement shared by individuals also affords them greater latitude to supplement institutional values with understandings of their own. Legislation may be described as an abstract reality modulating practices governed by social attitudes which in turn embody the immediate and actual norms governing all social transactions. However, national corporate environmental law is a tangible, uniformly definable value construct. The lack of ambiguity with which primary environmental values embodied in legislation are understood in relation to company

practice enhances the quality of relational mapping required to examine environmental values and attitudes in this study.

Inglehart's postmaterialist paradigm (Inglehart 1977) illustrates the limitations of an environmental consciousness concept which entails analysis of group environmental values and attitudes unconnected to a research dimension defining environmental commitment and action. The implication of Inglehart's thesis is that industrial societies which are not preoccupied with satisfying the fundamental material needs of its subjects are more likely to pursue post-bourgeois or postmaterial values, characterised by an increasing consideration of the opportunity cost of sound environmental practice. Such societies are described as experiencing a 'cultural shift', where the value structures in broad national and social groups evidenced change (Maslow 1970, Inglehart 1977). However, the theoretical conceptualisation of relations between requirement and goals do not account for the intentional or aspirational qualities of individuals or the political frameworks which represent and animate moral ideals (Cotgrove and Duff 1981). Inglehart states that postmaterialism should not be equated with a rejection of materialist values and results from his surveys are supportive of a concordance between both materialist and postmaterialist goals (Inglehart 1971, 1977). If the logic of this position is extended, the existence of strong environmental convictions and high material satisfaction in postmaterial societies could be mirrored by concurrent material convictions and high environmental satisfaction in material societies. Results of the Health of the Planet (HOP) survey lend support to the view that degrees of environmental attitude are not corollaries of national wealth defined as a measurement of per-capita gross national product (Dunlap, Gallup and Gallup 1993)[21].

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[21] There was a greater aggregate call for civic environmental engagement by the poorer nations and a larger demand for state measures to stimulate improvements in environmental practice by the richer industrialised nations. Interestingly, the call for more civic environmental engagement is a direct acknowledgement of the role to be played by personal commitment to effectuate ecological change, whilst apportioning responsibility to the third party State divorces personal responsibility and involvement in that process. Critically, what cannot be deduced on the basis of the survey is the actual environmental quality of existing legislative or state intervention traditions and individual action programs in responding counties. The HOP study represents one of very few extensive cross-national reports on environmental attitudes. Responding countries were Canada, USA,

The weakness of the postmaterialist model presented by Inglehart is that the dimensions it ascribes to postmaterialist society do not meaningfully substantiate environmental sensitivities in postmaterialist or materialist societies. Postmaterialist and materialist societies may well approach environmental concerns in ways which distinguish themselves; it is contended that these environmental propensities ultimately have less to do with the variegated ecological actions of groups of individuals but more to do with the enabling capacities conferred to individuals by institutions which specify the understood standards and mode of environmental engagement. Environmental behaviour and commitment is shaped by the scope of such capacities. The enabling function of individual and collective learning is examined in the following section in relation to environmental commitment and behaviour.

3.3 Environmental Consciousness as a Learning Process

The importance of environmental learning and change is explicit in Urban's environmental consciousness model but the theoretical basis of the term has been left largely undeveloped in Urban's work. Environmental change involves the absorption of hitherto undervalued or unpractised methods and beliefs through modes of learning. The cognitive dimension of environmental consciousness reflects ecological knowledge absorbed by individuals, organisations or cultures, whilst ecological knowledge is characterised by its emphasis on the multiple ecological contexts, risks and consequences of various forms of social production. Argyris and Schon (1978) indicate that many of the learning difficulties experienced by organisations can be attributed to the espoused and actual participative approaches to organisational learning, which atrophy company-wide learning potential. The first of two organisational learning methods is described by Argyris and Schon as 'single loop' learning, which involves making changes to detected faults in the operation of the implementation strategy without consideration of

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Brazil, Chile, Mexico, Uruguay, Japan, South Korea, Philippines, India, Turkey, Hungary, Poland, Russia, Denmark, Finland, Norway, Germany, Great Britain, Ireland, Netherlands, Portugal, Switzerland and Nigeria.

organisational rationales, values or the espoused theory of the company. The second organisational learning method, the 'double loop' involves modifying observed flaws in the implementation strategy and changing the logic and values governing company objectives. The transparency generated by double-loop learning aims at ensuring that company practices are consonant with company strategies and company ideologies facilitate continuous learning. Information systems which operate in a climate of openness, easy access to information and a commitment to improvement are in general more useful than those developed in organisational cultures marked by secrecy, guarded information and a commitment to protectionism. For a management system to be truly effective organisations with Model I theory-in-use tendencies will need to identify and uproot patterns of behaviour which hinder the accuracy and relevance of the knowledge basis through which a management system guarantees its success (Argyris and Schon 1978). A Model II theory-in-use management approach encourages company-wide organisational learning through emphasising:

(i) corporate openness;

(ii) the acquisition of valid information from all possible sources;

(iii) decision making and engagement based upon free and informed information with the most competent and relevant parties; and

(iv) the generation of company-wide commitment through monitoring and implementation strategies which highlight company commitment to improvement.

From a German perspective Kirsch (1990) concluded that organisations learn how to learn when they perceive that different organisation system components can positively or negatively impact the learning process. According to his thesis system component intensification is encouraged if there are points of reference within the system which promote the evolution of self-reflection from within the *Lebenswelt* of the organisation. Kirsch's ideas on organisational learning are partially drawn from the works of Habermas (1980, p. 109), who categorises the formal characteristics

of rational life in modern societies[22]. On this basis Kirsch distinguishes between three levels of rationality or three forms of cultural rationality which impact learning[23]. In both the Model I theory-in-use strategy and Kirsch's first level of rationality model the organisation and its learning processes are likened to instruments which fulfil prescribed objectives. In turn, the organisational system components have characteristically strong cognitive and weak self-reflection capacities. Patterns of environmental behaviour tend to follow a determined path which secures improvement through reduction of costs or material use maximisation within a defined financial framework. Organisations following the pattern of the second level of *Lebenswelt* rationality are more conscious of the existence of counter organisational cultures which may prompt change. On this level organisational system components are attuned to the requirements of fulfilling company objectives and thereby promoting company culture. Organisations on the third level of *Lebenswelt* rationality practice 'double loop learning' as the means to more effectively address the diverse objectives and learning requirements of an

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22 According to Habermas (1985) in the course of social evolution societies dislocate into *System* and *Lebenswelt* categories, described as zones of "*normfreier Sozietät*" and of "*normativ orientierten Handelns*" (Habermas 1985, p. 230). The *System* is described as the instrumental and strategic facilities of social action, an important component of which is "the economy". Habermas defines the *Lebenswelt* as a context-specific community, the members of which are identifiable through common behaviours and understandings mediated through language. The syntax of the context-specific language and cognitive communities is acquired through a socialisation process which defines the parameters of communicative action. In the context of social evolution the *Lebenswelt* can be differentiated into the components of culture, society and personality, which configure the processes of cultural reproduction, social integration and socialisation (Habermas (1985), p. 209). Social complexity increases as a consequence of these differentiations which can only be countered by the institutionalisation of new forms of social integration. In modern societies non-linguistic media such as finance and power mediate societal relations (Habermas (1980), p. 273) with the effect of compromising the context and coordinating faculties of an increasingly system-driven *Lebenswelt*. Habermas holds that the ecological crisis of modern industrial society can be understood as the consequence of a rationalisation of the *Lebenswelt*. Differentiation created by increasing system complexity fractures human spheres of engagement on systemic (statist and economic) levels and non-systemic (private and public spheres) levels. Structural ambivalence is illustrated by the externalisation of ecological effects which create systemic defects not reparable through coordinating media such as money or power. However, the operation of these principally economic media results in the diminution of *Lebenswelt* rationales, value orientations and standards. At the centre of social differentiation conflicts is the coordination process of the *System*, the modification of which will redress contradictory consumer forces at the root of ecological dissonance.

23 Kirsch describes the formation of the three levels of rationality. The first level of rationality (*derivative Lebenswelt* - the derived lifeworld) comes into existence when the predominant culture develops self-reflection capacities which translate into ideological hypotheses and arguments which engender new ways of thinking about understanding and learning. The second level of rationality is attained when the *derivative Lebenswelt* provides an institutional order and individual skills which can be effectively integrated into the existing ways of living and communicating - "*... Die derivative Lebenswelt ist gleichsam von sich aus offen gegenüber Verfremdungen durch andere Lebens- und Sprachformen..*" (Kirsch 1990, p. 515). Examples of alternative values described by Kirsch can be found in the worlds of art, 'culture', morality and legislative forms. The third level of *Lebenswelt* rationality, the rationality of the *Lebenswelt* itself is called into question, through evolving philosophic or other traditions, and this process of self-analysis perpetuates and reconfigures the learning process (Kirsch 1990, p. 517).

organisation. Heightened environmental consciousness becomes manifest through an organisation's consideration of the environmental impacts of the company, not simply within a rationalised economic framework but within the context of 'socio-ecology' from the workplace to wider society. Prerequisites for this form of corporate environmentalism are:

(i) synthesised environmental knowledge;

(ii) individual and collective evaluative frameworks in which to locate environmental concern, and

(iii) commitment to apply acquired environmental knowledge and concern.

Similar sentiments are voiced by Emerson and Welford (1997a) who argue that environmental learning is concerned about extensively revising ecological balances defining work practices and not simply engaging in activities associated with the control of environmental hazards. Cultural change of this nature will require a longer-term view of business practices, alongside the promotion of equity and equality issues (Welford 1997, p. 18). However, where environmental change is undertaken in companies revised learning strategies have tended to be animated via 'top-down' management approaches which may have the effect of containing the initiative of those workers who are intimately involved in the maintenance of corporate environmental protection (Emerson and Welford 1997a).

The impact learning can have on organisations has been explored by various authors (Fietkau 1984, Pautzke 1989, Argyris and Schon (1978), Kirsch (1990)). Fietkau (1984) argues that Environmental Consciousness, defined as the translation of ecological values into action, is linked to the changing relationship between working conditions, social ambience and technology. This change can be marked by gains or loss of control, or restrictions in the processes of human activity and engagement. Fietkau's hypothesis is that new values and forms of environmental action are essentially responses to lost or gained forms of control and new technology. Despite new opportunities created by environmental

practices, 'environmentalism' may pose difficulties in the form of cognitive overload, where individuals are forced into accepting new evaluative beliefs before and without necessarily modifying personal convictions.

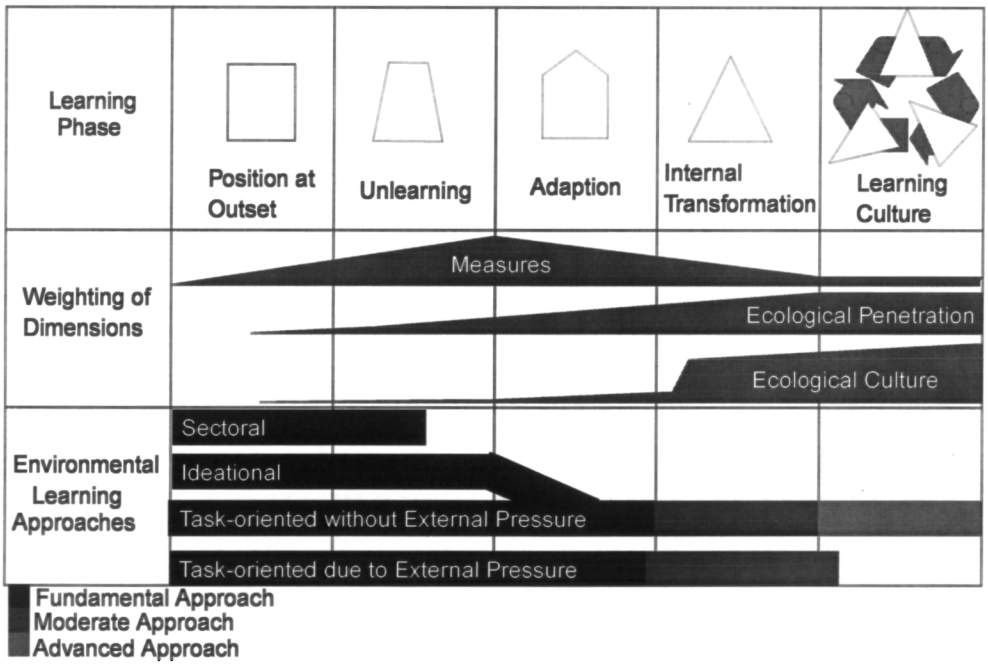
Learning can modify the balance of power in organisations through the spread of information and knowledge previously in the hands of so-called experts with the consequence that previously held views and conceptual positions are either questioned or devalued and the power held by previous protagonists undermined (Emerson and Welford 1997b). Power bases can also prevent organisational learning in two broad ways described by Pautzke (1989) as conscious and unconscious prevention. The purpose of conscious prevention is to maintain the legitimacy of existing structures of power through incentive systems and sanctions or through open and disguised threats. Unconscious prevention aims at diffusing the potential of contention by censoring information (Pautzke 1989). The dilemma confronting power brokers under such circumstances is one where the provision of learning is likely to expose or destroy the previously upheld values and rationale pursued by an organisation. Corporate environmentalism is likely to have limited impacts on existing company cultures where 'environmental affairs' is perceived to be a subsidiary business undertaking or is managed by individuals with little or no executive influence and the lack of learning provisions result in the continuation of the behaviour which would otherwise be questioned (Emerson and Welford 1997b).

Environmental education aims at heightening environmental consciousness but empirical studies strongly suggest that the acquisition of ecological knowledge is not necessarily a reliable predictor of environmentally-oriented behaviour. However, general differences can be demonstrated between the attitudes of correspondents engaged in strong environmental behaviour and those engaged in weak environmental behaviour.

Winter (1981) argues that environmental education aimed at promoting wholesale changes in environmental behaviour on an individual level will only be successful if the appeal to modify behaviour is favourably and societally anchored. Societal values and assumptions, which shape ideological emphases, also provide a motivational basis for individual action (Winter 1981, p. 68). Similarly, the success of vocational environmental education is dependent upon the motivational context and audience relevance. Hammerl and Rosenstiel (1996) consider the basic goal of environmentally-oriented learning to be the spread of ecologically relevant knowledge (Hammerl and Rosenstiel 1996, p. 19). It can also be argued that since this knowledge is absorbed from experience of environmental practice outside of existing organisational culture it should be exposed to the largest number of company employees as possible through communicative and participative company procedures. This measure will improve the likelihood that acquired information and practices become culturally anchored. On the basis of empirical work Finger et al (1996) concluded that companies fall in one of four ecological learning categories: (i) Sectoral Approach - Environmental measures are gradually introduced to one or a few departments. Despite possible increase in the personnel or departmental involvement environmentally-oriented activities remain selective. Therefore, company-wide ecological change and learning cannot be fully realised. (ii) Ideational Approach - Key personnel are selected to address undesirable corporate environmental developments under their control. Alongside making personal cultural changes one of the aims of the company may involve encouraging trading partners or customers to also develop more environmentally-conscious operations. One of the weaknesses of ideational environmental learning is that environmental concepts may be introduced to company practice before they are either fully understood or can be placed within the business strategy of the company. (iii) Task-oriented Approach due to External Pressure - Enforced company changes may be in response to a publicised environmental catastrophe, media campaign or through an influential pressure group. The organisation accommodates required environmental changes through extensive external support. However,

organisational culture characteristically emphasises increased security, quality and compliance factors rather than ecological improvement, quality and compliance factors. (iv) Task-oriented Approach without External Pressure - Ecological learning is described as task-oriented since the organisation has consciously developed a long-term strategy that aims at combining ecological criteria with key economic factors. A strategy group is created to develop an environmental concept which will latterly form part of the company-wide operational concept. Continuous improvement programmes and subsequently introduced measures maintain the credibility of ecological practice throughout the company. The systematic, integrative nature of ecological learning assuages the emotional and operational fractures which companies may experience through cultural change.

Figure 3.1: Corporate Ecological Approaches, Ecological Learning Phases and Ecological Penetration



based on Finger et al (1996)

In relation to these Environmental Learning Approaches a theoretical model of learning phases was developed (Finger et al 1996, p. 24) and presented in Table 3.2. These are described as:

(i) Unlearning, (ii) Adaptation, (iii) Internal Transformation, and (iv) Environmental Orientation. An organisation 'unlearns' when it becomes cognisant of the inappropriateness of negative corporate environmental impacts and attempts to

improve its environmental behaviour. The second learning phase of 'adaptation' is marked by a redefinition of the company's relationship with the natural environment, whereby ecological considerations are introduced to company operations through developed company projects and instruments. Company findings are assessed with the aim of further improvement. The 'internal transformation' phase is marked by a reassessment of how the company executes its 'mission', the quality of its processes and products, the relevance of selected ecological criteria. The self-reflection characterising this phase of learning suggests that corporate environmentalism has become a mainstream part of organisational culture. The 'environmental orientation' learning phase describes companies which have enabled all members of the organisation to effectively contribute to the continuous ecological improvement cycle of the organisation (Finger et al 1996). Environmental learning and the organisational culture of which it forms a part are mutually formative and tractable, which indicates the directional neutrality of learning and cultural states. Neither ecological inspiration nor aspirations are inevitable consequences of environmental learning. However, they are symptomatic of forms of corporate engagement and attitudes towards models of corporate sustainability:

> "*Diese Entwicklung in Richtung Nachhaltigkeit ist ein Prozeß, der sich über eine längere Zeitperiode und in mehreren Phasen entwickelt... Indessen muß der Prozeß noch weiter fortschreiten, um das Stadium zu erreichen, in der Ökologie in die Kultur der Organisation so integriert ist, daß die Funktion der von ihr hergestellten Produkte sowie das Verständnis der „Mission" des Unternehmens aus der Sicht der Ökologie hinterfragt wird ...*" (Finger et al 1996, p. 25).

The practice of environmentally-oriented organisational learning appears to follow similar stages outlined by theoretical models such as the above, but the passage towards company oriented sustainability is invariably fraught with internal paradoxes (Birke and Schwarz 1997). Integrating partial processes together with functionally unrelated departments is problematic since traditional rationalisation and productivity patterns, which configure organisation structure, conflict with the

demands of ecological methods. Lorenz (1996) noted the following encumbrances to ecological learning within organisations:

(i) hierarchical and functional company perspectives;

(ii) the separation of production configuration from its execution;

(iii) limited depth in production itself; unwritten procedures;

(iv) information overload;

(v) lack of a conceptual understanding of the implications of corporate environmentalism;

(vi) limited contact with customers;

(vii) inappropriate environmental values;

(viii) different interests pursued by stakeholders.

However, these handicaps are not insurmountable since small incremental steps can be made which finally ensure that a high return is made in company investment in knowledge (Lorenz 1996, p. 31).

Benchmarking techniques employed serve to increase company competitiveness through an analysis of internal activities and practices against external measures of best practice. Benchmark indicators include assessments of quality rates, productivity levels, development times and business processes, the principles of which can be applied in an ecological context (Rothery 1995; Schneidewind 1996; Business in the Environment 1999a). The combining of classical benchmarking techniques, which primarily have strong financial incentives, with ecological benchmarks, creates new competitive synergies complementary to the objectives of sustainable development. Benchmarks have normative dimensions shared by the elements of Environmental Management Systems (EMSs), providing companies the opportunity to systematically imbed environmental management strategies into organisational culture. Such activities and commitments are examples of the third cognitive dimension of Environmental Consciousness, defined by Urban (1986, p. 366) as '*umweltbezogene Handlungsbereitschaften*'

(preparedness to engage in environmentally-related activities). On a corporate level Environmental Management Systems currently represent the most effective means of fully integrating ecological strategies into organisational practices. Firms which use an EMS are consequently described as engaging in *Umweltbewußtes Management* (Sietz 1994a; Nussbaum 1995). The internal operational discipline engendered by Environmental Management Systems increases the ability of organisations to more effectively understand and manage accurate environmental information about themselves and their interfacing external worlds. This information provides a sound basis for potential material and energy savings through which to secure economic and ecological advantage. Conducting regular, structured environmental audits and compliance with EMS procedures reduces the damage that firms pose to natural resources and society at large. A reduction in the negative environmental impacts of corporate activity through environmental management reduces liability risk encountered by an organisation. Commitment to the system and following through on system recommendations will ensure that continuous improvement remains a feature of company practice and strategy. In Chapter Five the theoretical insights into environmental commitment and action defined in this Chapter are applied to the structure and implementation of ISO 14001 and the Eco-Management and Audit Scheme (EMAS) and its successor EMAS-II. Environmental management systems[24] enable corporations to demonstrate environmental commitment in a quantifiable manner and are symbolic of high corporate aspirations in relation to environmental consciousness.

[24] Prior to the establishment of ISO 14001 as the international EMS standard and the introduction of EMAS national systems were commonly used, such as BS 7750, upon which EN ISO 14001 is based, whilst *DIN 33921* was devised for use in Germany.

4 SITUATING ENVIRONMENTAL VALUES

Discussion of environmental consciousness involves an exploration of the particular ways in which constellations of environmental values and understandings affect environmental attitudes and related behaviour of social groups. On an industrial level environmental consciousness is necessarily linked to the legislative apparatus that directly defines the scale and scope of environmental engagement. Discussion of the environmental value orientations in the UK and Germany also implicitly references the environmental values promoted by the European Union, which has evolved into the central organ of environmental decision-making amongst EU Member States. Chapter Four examines the impact of environmental instruments, policies and legislation introduced by the European Union. UK and German environmental legislation is considered within the framework of EC environmental law and policy concepts. This will enable the relationship between environmental law, as the specifier of shared environmental understandings and environmental attitudes and the behavioural response founded upon held values and knowledge, to be examined more concretely in the context of UK and German SMEs.

4.1 Environmental Instruments

Environmental instruments are here defined as specific measures introduced by environmental policy actors in order to realise particular environmental objectives. The environmental instrument typology in Table 4.1 was developed by Jänicke et al (1999) to illustrate the degrees of behavioural influence State measures exert within society. It has been modified to indicate the impact of environmental instruments on business enterprise.

Regulatory instruments serve to qualitatively and quantitatively define environmental standards and levels of practice. They have pronounced administrative and surveillance characteristics which are important assets in the containment of dangers associated with environmental degradation.

Table 4.1: Impact of Environmental Instruments on SMEs

Instrument Groupings	Instruments	Impact on SMEs	Impact on Large Enterprises
Regulatory Instruments	**Compliance Costs of:** Laws and Prohibitions; Authorisations; (Pollution) Limit Setting; Product Standards; Process Standards; Prosecution;	High	High
Planning Instruments	**Compliance Costs of :** Spatial Planning; Building Plans; Land Use Plans; Clean Air Planning; Waste/Water Management Plans;	High	High
Economic Instruments	**Costs associated with**: Environmentally-conscious Purchasing;	High	High to Medium
	Environmental Taxation; Environmental Duties; Licensing, Certificates;	High	High to Medium
	Benefits from: Environmental Tax Breaks and Exemptions; Government Subsidies;	Low	Medium to Low
Co-operative Instruments	**Engagement in:** Co-operative Negotiations; Networking Formations; Formal/Informal Agreements; Sectoral Practices; Self-obligations.	Low	Medium to Low
Information Instruments	**Engagement in:** Information collection and Instruction via State Institutions; Standardised Private Reporting; Environmental Education Training;	Low	Medium

The confrontational nature of regulatory instruments is simultaneously a source of its strength and weakness. On one hand regulation confers citizens under its jurisdiction with the right to enjoy defined environmental quality, but these instruments equally engender resistance from industrial and like-minded political actors, whose pursuits regulatory measures curtail. Although Jänicke et al comment that regulatory instruments have thus far dampened the dynamics of technical development[25], it should be noted that this is not a characteristic of environmental regulatory instruments but symptomatic of the conceptual evolution of applied sustainable practice.

Planning instruments relate to the traditional frameworks of environmental control, including air quality management, land and waste management, water quality and noise control. In practice environmental planning is conducted on macro and meso levels. The expansive nature of environmental authority presents regions with the opportunity to ecologically shape their socio-economic landscapes through decisions which determine the location and nature of industrial development, for example, the preservation of green sites and the formation of infrastructures which complement regional ecologies. However, pragmatic pressures associated with financial regional flows and the benefits of commercial developments can compromise well-intended environmental aspirations. For example, funding and support may be allocated to projects which do not result in quantitative improvements in environmental quality or the objectives of which may conflict with deeply held environmental values in society.

Economic incentives in the form of distributive measures (ie, Government subsidies or tax exemptions) may encounter little opposition, but such instruments often work against environmental principles. Under such conditions polluting companies,

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25 "*... Ein weiterer Mangel des ordnungsrechtlichen Ansatzes lag bisher darin, daß er zumeist wenig technischen Fortschritt stimuliert. Knappe Investitionsmittel fließen in additive Umweltschutztechnik und nicht in ökologisch angepaßtere Technik. Ökologische Innovationen lassen sich offenbar schwer verordnen und erfordern ein flexibleres Vorgehen ...*" (Jänicke, Kunig and Stitzel (1999), p. 102).

which are normally able to externalise their environmental damage, compound their gains through these additional financial benefits. Generally speaking and discounting for possible sectoral or material factors, the major beneficiaries of economic incentives are larger companies as producers of greater pollution mass. Taxation drawn from polluting production and products is another means of controlling offending behaviour and can prompt technical innovation. The voluntary development of environmental management systems is an example of an economic instrument which governs corporate practices in order to promote environmental change. The German ecological tax reform and those introduced in the UK are instruments which promote labour investment above the promotion of environmentally damaging processes and products (HM Treasury 1998b, HM Treasury 1999).

(In)formal agreements and negotiations are useful tools employed to reconcile the differences between environmental protection and industry. Agreements between environmental authorities and polluters or environmental associations and polluters are more likely to be successful where environmental consciousness is high and the opportunity cost of failure appreciable (Erskine and Collins 1996). One weakness of cooperation instruments remains the often self-interpretive nature of self-regulation or its wilful abuse. A related weakness of self-regulation is that it can be used to retard the impetus for needed change if the co-operative process can be controlled by strong industrial lobbyists. The extent to which such tactics are successful stands in relation to the Government's redress to laws and prohibition measures in the absence of satisfactory progress of environmental cooperation.

The quality of dialogue between environmental and business interest groups is a product of the quality of knowledge and information shared by the debating groups. Industrial groups are, for example, often acutely familiar with the relation between industrial production and carcinogenic releases resulting from industrial production,

whilst those directly affected remain oblivious to the seriousness of the environmental impact (Balderjahn 1995; Cox et al 1998; ENDS 1998d). The response to environmental problems experienced by affected groups is directly related to the understanding of the environmental impact of the concern and its implications. Therefore, companies with limited environmental knowledge or appreciation are particularly vulnerable to the dangers associated with sustained or committed environmental incidents. The suppression, absence or dissemination of information can subvert or promote the requirement to introduce legal prohibitions on used materials and product processes. Consequently both the existence and absence of processes for environmental data collection and statistics formulation are key determinants of environmental perception. Another important factor in relation to environmental information is the policy context in which environmental data is interpreted and the extent to which Governmental and non-Governmental organisations can animate public response on the basis of their environmental findings. In practice the range of environmental instruments exercised by Government is more complex than those represented in Table 4.1 whilst the exercise of instrument types is much more variable and mixed. The impact of a selected instrument is often significantly influenced by the dominant political styles embraced by nation states as is illustrated in Chapter Six. Planned strategic objectives within adopted political frameworks are also important factors influencing environmental sensibility in addition to the interrelatedness of Government and Non-Government Organisations (NGOs).

4.2 Environmental Principles

Environmental principles underpin the rationale of all environmental instruments and the policies of which they form a part. All European Union Member States are subject to the environmental legislation formulated by the European Community. Article 174(2) of the European Union Treaty (EUT) states that:

> Community policy on the environment shall be ... based on the precautionary principle and the principles that preventative action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay".

Environmental protection, as expressed under the revised European Union Treaty (EUT) Article 174 is, therefore, driven by the principles of 'the polluter pays', 'precaution', 'prevention', and 'rectification at source' and occupies a pivotal position in all policy development processes as an integrated socio-economic consideration[26]. Despite the singular focus given to these principles in the following review, in practice they unavoidably interface with and simultaneously operate with other important environmental principles at the centre of the European Union environmental policy project [27].

4.2.1 The Polluter Pays Principle

The polluter pays principle (*Verursacherprinzip* - the pollution 'Causer' Principle) is evidenced where individuals or groups of individuals responsible for environmentally polluting activities duly compensate for environmental damage caused. Damage to the physical environment resulting from environmentally abusive behaviours and misuse of finite resources are thereby internalised. Criminal and civil liability laws exist within the legal frameworks of EC Member States which account for harmful acts exacted on the public, including the physical environment and the violation of an object of legal protection resulting in defined damage[28]. In such cases compensation at the polluter's expense is provided or

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26 Prior to the Maastricht Treaty environmental action played an subsidiary role in policy making. Article 130r(2) of the SEA indicated that 'Environmental protection requirements shall be a component of the Community's other problems..'. Under the EUT environmental requirements were prioritised, so that environmental protection requirements must be integrated into the definition and implementation of social and economic policy of the Community as a whole (EUT Art. 174(3)). Article 6 (*ex* Article 3c) states that "Environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities .... in particular with a view to promoting sustainable development." Article 176 of the EUT states that environmental protective measures defined by the European Council "... shall not prevent any Member State from maintaining or introducing more stringent protective measures... " which are compatible with the European Treaty and in keeping with the Commission's notification procedures.

27 Many of the principles shaping contemporary environmental policy are rooted in responses to International Environmental Programmes or Protocols highlighting the need for less polluting and degrading engagements within the environment. The Environmental Programme driven by the SPD under Willy Brandt in 1971 and developed by successive German Governments has been instrumental in the formulation of important environmental principles driving European Union environmental policy. Included principles are the: 'polluter-pays' (*Verursacherprinzip)*, 'pre-care' or 'prescience' (*Vorsorgeprinzip*), 'cooperation' (*Kooperationsprinzip*), the 'collective responsibility' (*Gemeinlastprinzip*), 'precaution' (*Prinzip der Vorsicht*) and 'substitution' (*Substitutionsprinzip*). As is true of environmental factors within ecological systems, environmental principles tend to operate in relation to each other.

28 For example, violations of integrated pollution and waste management controls are covered by Part I (S. 33(1) and Part II (S. 63(2), 73(6-9) of the Environmental Protection Act (1990) 1999 and §906(2) *§§324-330d Strafgesetzbuch (StGB), Bürgerliches Gesetzbuch (BGB),* §14 S.2 *BImSchG* ; contaminated land by Environmental Protection Act (1990) 1999 Part IIA and §906(2) *BGB* ; statutory nuisance by Part III of the Environmental Protection Act 1990 and §14 S.2 *BImSchG, §§324-330d (StGB)* ; genetically modified organisms by Part IV and §§ 32 ff.

reparation for injury to individuals, property and economic loss can be pursued *vis-à-vis* private-law actions by the individual experiencing damage.

On an EC level, the polluter pays principle is demonstrated through liability associated with 'traditional damage' to health and property, which can be environmental in nature. Although Member States are obliged to comply with the objectives of EC legislation, the legislative convention has been to grant Member States wide autonomy in its transposition[29]. Therefore, variation in the mode of environmental compliance between Member States is unavoidable where few of the existing environmental Directives have defined liability provisions[30]. In those instances where environmental liability has been exclusively identified and the polluter pays for environmental offences committed, environmental behaviour can be favourably influenced by the economic opportunity cost of not avoiding environmental offences. Hence the more widespread and rigorous the application of environmental liability, the greater the likelihood that companies will implement preventative, 'precautionary' measures which internalise environmental costs and reduce environmental risk and damage (European Commission 2000, p. 12). Another anticipated impact of increased internalisation of pollution is heightened interest in corporate investment in R&D for improving environmental knowledge and technologies[31].

Gentechnikgesetz (GenTG) ; pollution of controlled waters by Sections 161 to 161D of the Water Resources Act 1991 and §22 *WHG* ; damage to sites of special scientific interest (SSSI) and other protected areas by the Wildlife and Countryside Act 1981, and *§§324-330d (StGB), Bundesbodenschutzgesetz.*

29 Refer to Appendix D on the Subsidiarity and Proportionality Principles.

30 A few EC environmental Directives or Regulations contain requirements for effective enforcement mechanisms but liability action is not specified. Council Regulation EEC/259/93 on the Supervision and Control of Shipments of Waste within, into and out of the EC obligates Member States to take appropriate legal action to prohibit and punish illegal traffic (Article 26(5)), whilst Council Regulation EC/338/97 on the Protection of species of Wild Fauna and Flora requires that Member States take appropriate legal action to prevent and punish actions which contravene the objectives of the regulation (Article 16). Therefore, although the European Commission can bring Member States before the European Court of Justice for environmental non-compliance, it does not currently have the authority or resources to either enforce or impose criminal penalties against private individuals responsible for environmental violations.

31 The White Paper also acknowledged that more stringent liability regulation might result in a 'more substantial impact' on SMEs than on larger enterprises, whose size often belied their contribution to environmental pollution. However, undesirable "side effects such as an increase in the share of damage caused by SMEs could be mitigated by more targeted use of national or EC support mechanisms aimed at facilitating adoption by SMEs of cleaner processes..." (ibid, p. 28).

Comparing the practice of the polluter pays principle at an EC level with the conceptual scope of environmental liability, upon which this principle is based, reveals considerable deficiencies in its exercise. In cases where an environmental violation has taken place, the onus is invariably on an ill-equipped plaintiff to establish causality between the violation of the legally protected object and the act of damage[32]. Within the European Union the German environmental liability law (*Umwelthaftungsgesetz*) currently offers the most advanced legal framework to account for environmental damage. The scope of the *Umwelthaftungsgesetz* will be discussed in Chapter 4.3.4, but even this German model reveals significant regulatory deficiencies when compared with the essential features of environmental liability discussed above. Legal definitions of environmental liability have thus far proven to be poor reflections of their potential enactment. It is envisaged that future application of the polluter pays principle through EU environmental policy will practically accommodate environmental damage to natural resources alongside conventional damage to individuals, goods and site contamination[33].

4.2.2 Precautionary Principle (*Vorsorgeprinzip*)

In the history of international environmental management and control the Precautionary Principle is relatively new, but influential in that it animates the fundamental logic guiding environmental policy and instruments. '*Vorsorge*' or so-called 'precaution' is applied where knowledge deficiencies exist in critical fields which currently prevent definitive clarification on the existence or degree of

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32 Drawing upon English legislation, even where a defendant appears to be liable on the grounds of negligence, establishing such liability is subject to a range of tests. Firstly, a legal 'duty of care' must exist on the part of the defendant to the plaintiff; that duty of care has to be breached; resultant damage must occur to something owned by the plaintiff in order to recover damages; the particular type of damage experienced by the plaintiff could have been foreseen by the defendant; causation has been successfully established. The English doctrine of *res ipsa loquitur* will support the plaintiff's claim of negligence but only where it can be proven that the action causing damage was under the sole management and control of the defendant (Sweet and Maxwell 2000, C1/7). Proven negligence or a breach of a duty of care results in fault-based liability which is a common feature of Member State environmental frameworks, in keeping with the rule of *Rylands v. Fletcher*. Normally in the case of damage exercised on used land, the land would need to have a special purpose or use beyond that which is general or ordinary in the community, bringing with it an increased danger to others, as specified in *Rickards v. Lothian*. Less common is the use of strict liability based on proof of causation regardless of fault, which does not require an establishment of *mens rea*, negligence or the lack of a duty of care on the part of the defendant to secure legal liability.

33 For a detailed review of the different environmental liability options considered by the EU, refer to European Commission (2000).

environmental danger. It should also be applied to situations characterised by significant degeneration in the quality of the environment or where human safety is endangered (SRU 1978, p. 577). The *Vorsorgeprinzip* prescribes that actions or activities should be curtailed in order to avoid potential damage to the environment, *ex ante* (von Moltke 1988) and is, therefore, associated with the 'Best Available Techniques' (BAT)[34]. In practical terms *Vorsorge* refers to deliberately planned measures which account for environmental dangers before their envisaged impacts take effect. Extensive *Vorsorge* is impossible without the availability of highly relevant and accurate information relating to foreseeable spatio-temporal implications and without procedures for the systematic collection of applicable data. The *Vorsorgeprinzip* is primarily defined as a safeguard against danger (*Gefahrenvorsorge*)[35]. It also operates as a safeguard against the abuse of resources (*Resourcenvorsorge*, *Wasservorsorge*), through which its exercise via the planning capacities of the State guarantee that ecological efficiencies are not compromised by industrial mismanagement or misplacement.

The *Vorsorgeprinzip* was introduced to German environmental policy in the late 1960s when it was acknowledged that environmental provisions designed simply to contain hazards or eliminate environmental damage were not sufficient measures to address environmental problems. *Vorsorge* principles targeted the protection and care of all natural resources. The generally established causal link between intensive processes of industrialisation and the onset of *Waldsterben* furnished the *Vorsorgeprinzip* with a resonance in (West) German commercial, legal and public

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[34] 'Best Available Techniques' or 'Best Available Technology' (BAT), as the term was described subsequent to the exercise of Directive 96/61/EC, refer to the most advanced expression of activities and the most suitable operation methods applied to the most effective techniques in order to prevent and reduce (where not possible to prevent) emissions and their impact on the environment. 'Techniques' refer to the technology used, the way that installations are designed, built, maintained, operated and decommissioned. 'Available' refers to the accessibility of techniques in an industrial sector, as defined by the costs, advantages under technically and economically viable conditions. 'Best' refers to the most effective means of achieving environmental protection.

[35] BImSchG §5(1.2) indicates that precautionary measures should be undertaken to prevent harmful effects on the environment within the parameters provided by BImSchG §5(1.1) by emission control measures defined by BAT as minimum standards. This precautionary rigour was missing in corresponding UK regulation prior to Pollution Prevention and Control Regulations (1999). Although installations could be operated to BAT standards, Appendices 1.2, 1.3 and 2.1 of the Environmental Protection Act 1990, and Schedule 4 of the Environmental Protection (Prescribed Processes and Substances) Regulations 1991, specified the use of BATNEEC standards as the legal minimum to control releases from Part A and Part B prescribed processes.

spheres. Reflections on the evolution of post 1970s environmental politics in Germany and on the basis of discussions conducted with German industrialists have led to the conclusion that the *Vorsorgeprinzip* became a cultural maxim justifying the introduction of national environmental measures. Its impact was evident on State, *Bundesländer* and local levels through measures aimed at heightening public environmental consciousness and addressing the implications of environmental risk. Subsequently since the early 1980s technical standards, environmental legislation and safety measures in Germany have been designed to more closely reflect environmental care and the evolving environmental standards.

The *Vorsorgeprinzip* was first introduced to the international scene by the German government in 1984 during the Bremen Declaration at the First Conference on the North Sea to supplement existing EU Directives on hazardous wastes and effluents in aquatic waters and rivers[36]. This year was also marked by the refusal of the UK Government to endorse *Vorsorgeprinzipien* to address pollution concerns associated with acid rain[37]. Its importance as a guiding principle of international environmental law was consolidated through its centrality in the concept of sustainability as outlined during the UN Conference on Environment and Development in Rio de Janeiro in 1992[38]. The first conceptual reference to the *Vorsorgeprinzip* in the UK environmental policy framework was made in 1990 (Department of the Environment 1990, p. 11) and subsequently within the context of the UK Sustainable Development Strategy (Department of the Environment

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36 The first North Sea Conference in 1984 resulted in the introduction of measures between North Sea bordering countries (Belgium, Britain, Denmark, France, the Netherlands, Norway and West Germany) in order to reduce the dumping of harmful wastes in the North Sea and reduce the effluent levels in rivers receiving water from the North Sea. These rivers included the Humber, Forth, Tyne, Tees, Thames, Rhine and Elbe. At the Third North Sea Conference held in the Hague in 1990 agreed reduction levels were made legally binding for the first time and enforceable by 1995. Measures included a 50% minimum reduction of hazardous substances on rivers and estuaries on 1985 levels, 50% cut of inputs of dangerous substances from the air, 70% reduction major hazardous wastes reaching the North Sea, and secondary treatment of municipal sewage discharges and effluent discharges from industry in relation to the North Sea.

37 Refer to Section 6.1.3 on National Policies and Environmental Modernisation.

38 Principle 15 of the Rio Declaration on Environment and Development reads: "In order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." (Report of UNCED , Distr. GENERAL, A/Conf. 151/26 (Vol 1), 12 August 1992).

1994, p. 7, 33, 34) although the intended method of implementing it in the context of sustainable development was not defined. Until the late 1990s the UK's embrace of the *Vorsorgeprinzip* can be described as largely cosmetic in applied terms, before which time it received only vocal exercise in environmental policy making circles. The UK's philosophical position was more closely aligned to 'preventative' environmental policy principles than with any other (Cameron and Abouchar 1991). The UK was often the opposer and at best, begrudging adopter of European agreements with *Vorsorge* implications which promoted reductions in pollution linked to environmental uncertainties ahead of proven scientific risk or financial cost savings (Boehmer-Christiansen 1988; Weale 1992)[39].

Since the *Vorsorgeprinzip* is at the heart of EU environmental policy it finds expression through many Directives, such as Community Directive 97/11/EC on Environmental Impact Assessment and Directive 98/24/EC, concerned with improving the health and safety of employees from work related (chemical) risks in keeping with the principles of environmental care[40]. Reported difficulties associated with a global definition of the *Vorsorgeprinzip* (Gundling 1990; Birnie and Boyle 1992; Holder 1997) are related to the fact that *Vorsorge* involves risk assessment prognoses qualified by the interpretations of social groups. Different considerations of risk are to be anticipated from different groups within and representing nation states facing contrasting social and economic challenges. Proponents of this view therefore argue that despite the validity of the principle, '*Vorsorge*' itself is not subject to legal particularisation in the conventional sense and theoretically, if given licence to be poorly exercised, could operate as an

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39 Refer to European Directive 76/464/EEC. A similar UK response was echoed in relation to the North Sea Conference Agreements, until in 1989 the UK Government agreed to reduce its net emissions of some of the listed substances in line with BAT requirements.

40 Translating the preposition and verb '*für (etwas) vorsorgen*' has the meaning of 'to provide for (something)', '*sich sorgen um*' the meaning 'to worry about', '*sorgen für*' is 'to care for", whilst the prefix '*Vor*' reflects antecedence and is typically rendered 'before', 'pre', and 'fore'. The concept of *Vorsorge* also carries very positive connotations of affect which perfectly mirror those measures employed to care for and preserve the well-being of the natural environment before environmental damage through social production is experienced. This strategy contrasts with *Nachsorge* which involves the appliance of measures *after* the natural environment encounters damage as a consequence of social production. Refer to Boehmer-Christiansen (1994, p. 38) for similar explanation.

unprincipled implement without environmental cogency. The position adopted by the European Commission[41] in relation to the 'Precautionary Principle' counters this scepticism by highlighting its growing centrality in environmental risk assessment, risk management and risk communication processes of European environmental policy. The Commission also emphasised that the Precautionary Principle should not be construed as a politicisation of science, acceptance of zero-risk, or justification for embracing protectionist measures, but as a rationally constructed framework for decision making in the face of scientific uncertainty[42]. Original and perhaps current difficulty defining the *Vorsorgeprinzip* in the English speaking world is also related to its description in the English language as the 'Precautionary Principle', which is both lexically and semantically misleading. It is here contended that the term 'precaution' does not capture the dynamics of *Vorsorge*[43] and is in fact a more accurate legal translation of the *Vorsichtsprinzip* with which it can be confused. The *Vorsichtsprinzip*, which shares equivalence with the 'Principle of Prevention', is a well-established principle in environmental legislation. The *Vorsichtsprinzip* prescribes legal measures to protect the environment *ex post*. As is true of the *Vorsorgeprinzip* the *Vorsichtsprinzip* is not limited to the reparation of environmental damage but aims at preventing future damage. Subsequently empirical factors influencing the *Vorsichtsprinzip* and the *Vorsorgeprinzip* are the availability of relevant knowledge and information[44], defined procedures for the quantification of environmental damage[45] and monitoring procedures to ensure that applied measures are appropriate and modifiable in the event of technical change

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41 Communication from the European Commission on the Precautionary Principle (COM 2000/0001).

42 Refer to Appendix D on the relationship between the Proportionality and *Vorsorge* principles.

43 The term *Vorsorgeprinzip* was explained through an analysis of German air pollution by von Moltke (1988), where it was officially translated as the 'precautionary principle'. However, the German translation for 'precaution' is closer to '*Vorsicht*' or '*Vorbeugung*', with different conceptual and legislative connotations to *Vorsorge*. Subsequently, von Moltke (1991) criticised the English translation of *Vorsorge* in the Report for the Royal Commission in 1988. A functional and semantic translation of *Vorsorgeprinzip* lies between the terms 'Prescient Principle' and 'Principle of Pre-environmental Care'. The former term conveys the functionality of *Vorsorge* as the application of foreknowledge to situations before scientific evidence corroborates the existence of significant environmental risk. The latter term reflects the form of environmental engagement and outcomes of applied environmental sensitivity.

44 For example, Directive 90/313/EEC on the Freedom of Access to Information on the Environment.

45 For example, Directive 97/11/EC on the assessment of the effects of certain public and private projects on the environment.

or new knowledge[46]. Whilst the *Vorsorge* and *Vorsicht* principles both aim at 'preventing' environmental degradation they are distinguishable through their modes of operation. *Vorsorge* includes and focuses on uncertainty in its assessment of risk, whilst *Vorsicht* exclusively attends to the scientifically verified 'certainties' of potential risk. Additional differences between *Vorsorge* and *Vorsicht* are highlighted by the 'Source Principle'. In keeping with this principle environmental measures should aim at rectifying environmental damage at its source, in contrast to the principle of 'Prevention' which arbitrarily involves the use of, or can be satisfied by, post environmental damage (*Nachsorge*) or end-of-pipe techniques. As is true of the *Vorsorgeprinzip* the 'Source Principle' also gravitates towards emission standards and BAT solutions as opposed to environmental quality standards and BATNEEC methods to address environmental damage at source.

4.3 EU Environmental Law and National Interpretations

In Chapter Three environmental consciousness is described as a construct through which environmental values, attitudes and behaviours are identified. These construct dimensions do not evolve in isolation but, as is true of verbal languages, are shared codes through which knowledge and understanding are interpreted and codified. Language is driven by ideas and formulated syntax which defines phonemic content. In a corporate setting enterprise is driven by ideas, the form and boundaries of which are defined by industrial law. It is here argued that without consideration of the environmental 'grammar' which frames business practice, one of the most important bases upon which to attach contextualisations of underlying values and business attitudes would remain unreferenced.

In the following section a range of EU environmental Directives are reviewed. This section will also illustrate how the EU environmental regulatory body, despite its push towards legislative uniformity through direct regulation, concedes to a

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[46] For example, Directive 96/62/EC on ambient air quality assessment and management.

national, institutional pull towards local interpretations or personalisations of EU environmental law. Although the choice of Directives is not exhaustive, it is felt that those selected capture the central aspects of industrial pollution and ecological management. The content and enactment of these Directives will, therefore, feature strongly in EMS implementation, defined in this study as demonstrable corporate environmental action.

4.3.1 Public Access to Environmental Information

The EU Directive 90/313/EEC on public access to environmental information entitles the public to environmental information possessed by governmental or public authorities in any of the EC Member States not exempted on the basis of commercial confidentiality or national security. The Directive defines 'information' to include all activities which impact the quality of water, air, soil, fauna, flora, land, natural sites and those measures aimed at protecting environmental media, such as administrative measures and environmental management programmes. The framework guidelines require public consultation before the authorisation of a project subject to environmental assessment, rather than before commencement of the work. The decision reached by the respective authority and the reasons for reaching that decision will now need to be made public, alongside the necessary measures to offset adverse impacts[47]. A key characteristic of projects subject to mandatory assessment is size, but the implications of highlighting the environmental impacts of such projects in the public domain are not unrelated to the activities of smaller projects. The greater emphasis placed on environmental responsibility and preventive procedures defined by BAT will invariably shape the applied technology and techniques for smaller projects, the qualitative impacts of which are also prone to exert significant pressure on the natural environment.

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47 Refer to Annex I of Directive 97/11/EC for the list of projects which require mandatory environmental assessments.

The EU Environmental Information Directive came into force in the UK through the Environmental Information Regulations (1992)1998. These regulations supplement the IPC and LAPC authorisation information placed on public registers through the Environmental Protection (Applications, Appeals and Registers) Regulations 1991. The latter legislation requires that all applicable parties as defined by EU Directive 90/313/EEC provide environmental information to the public held in written, visual, aural, database, computer record, register and report forms[48]. 'Applicable parties' will include environmental information held by central and local government or other bodies with regulatory functions, such as the Environment Agency, Health and Safety Executive and English Nature. Information issued is normally provided through registers[49] or annual reports, which selected parties must periodically complete[50]. The Access to Environmental Information Act 1999 makes the UK Secretary of State responsible for the compilation of an annual pollutant release and transfer register, from June 2000. This register is to hold details of substances considered to have hazardous properties and operators of included processes will need to provide contributory information for the register on a yearly basis.

The content of Directive 90/313/EEC has been introduced to the German legislature as the *Umweltinformationsgesetz 1994, (UIG)*, (Environmental Information Law) and the *Umweltstatistikgesetz (1994)1997, UStatG* (Environmental Statistics Law). The objective of the *UIG* is to guarantee access to

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48 In addition to information compromising commercial confidentiality or international security, information not accessible to the public relate to material forming part of legal proceedings or material which could result in environmental damage.

49 HSE and fire authorities keep a register of enforcement and safety notices they have issued under the Environment and Safety Act 1988; Town and Country Planning Act 1990 provides for public access to planning registers; IPC processes and Waste Management Licenses registers are held under the Environmental Protection Act 1990; a register of discharge consents are maintained under the Water Resources Act 1991.

50 Environmental information requested from the UK Secretary of State is normally accessed by notice in writing served on an enforcing authority. In turn, the enforcing authority (ie, Environment Agency or local enforcement authority) may serve a notice in writing to any person, who would be obliged to furnish to the authority with information which it reasonably considers that it needs as is specified in the notice (Environmental Protection Act (1990) 1999, Part I, S.19(1) S. 71; Clean Air Act (1993) 1998, Water Resources Act (1991) 1998 S. 191A and 191B, Groundwater Regulations (1998) R. 18). However, each producer subject to certifying obligations under the Producer Responsibility Obligations (Packaging Waste) Regulations 1997 will maintain and retain records of the information as specified by the appropriate Agency for at least 4 years after making the record of information. The producer should also make a return to that Agency with that information at the same time a certificate of compliance is furnished to the appropriate Agency (Producer Responsibility Obligations (Packaging Waste) Regulations 1997, Part V, Rs. 22 and 23).

the information on the environment held by Federal, *Bundesländer*, associations, authorities or other legal bodies or persons entitled to hold information. *Umweltinformation* is defined as it is in UK legislation, namely, all written, graphic data or data stored on other information media, relating to the condition of the air, soil, flora and fauna, natural habitats, water(ways) and those activities which impact the quality of environment, including noise. The definition of environmental information also includes the activities and measures employed to protect the environment, such as administrative measures and environmental programmes[51]. Both the Access to Environmental Information Act 1999 and *Umweltstatistikgesetz (1994)1997* are concerned with data collection related to environmental impacts of industrial activity for statistical analysis and environmental policy formation[52]. However, the scope of the *Umweltstatistikgesetz* has been significantly wider. What distinguishes the UK and German legislative spheres of operation is the emphasis on scientifically proven understandings of environmental hazards in the one instance and the conscious embrace of all industrial processes with varying degrees of proven environmental hazards in the other. Both interpretations of the EC Directive 90/313/EEC reflect the historical gravitation towards preventative principles in UK and *Vorsorge* principles in German environmental legislative frameworks, which have different effects on the range of environmental significance attached to industrial activities. Consequently these principles will impact the scope of application of the polluter pays (*Verursacher*) principle afforded in law in distinct ways. A review of UK and German regulation covering Directive 90/313/EEC indicates that the German provisions penetrate the industrial life of business enterprise to an extent that is currently not experienced in UK SMEs and larger firms. Currently companies obliged to conform to the Access to Environmental Information Act are those requiring conventional (environmental) site licences, discharge and trade effluent consents, etc. These firms were and in many senses

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51 §§3(2) and 7 of the *Umweltinformationsgesetz*; Environmental Information Regulations S.5(4-7).

52 "The Secretary of State shall establish and maintain a pollutant release and transfer register ("the register")... " Environmental Information Act, Section 1(1); the purpose of the *UStatG* "*... Für Zwecke der Umweltpolitik werden Erhebungen als Bundestatistik durchgeführt...* " §1 of the *UStatG*.

still are subject to preventive and end-of-pipe controls through Local Authorities and Environmental Agencies which perform an emissions monitoring role. Information reporting and publication patterns to Local Authorities and the Environmental Agency complement existing rhythms of environmental information provisions. In Germany the legal parameters defining reportable environmental information under the *Umweltinformationsgesetz* and *Umweltstatistikgesetz* have been quantitatively and qualitatively wider. Consequently the (sectoral) range of companies obliged to attend to the ecological impacts of their activities is larger and the information requests on industrial activity is greater. It is here surmised that this greater environmental focus in law generates ecological concern and sensitivity in ways less likely to be displayed where regulatory demands are less exacting. This postulate qualifies the claim that German society as a whole registers particularly high concern for the environment (Randlesome 1994; Reeves and Kelly-Holmes 1997). Earlier discussions on Inglehart's paradigm also indicated that the notion of the cultural shift from material to postmaterial environmental values often fails to mirror the actual value and attitudinal mosaics of industrial and non-industrial societies. The argument presented here and throughout the national legislative review is that *institutional* attention required or received by particular environmental concerns may strongly influence associated attitudes and values by virtue of applied commitment and action. However, personal inner conversion is not a condition of such applied commitment and action.

The claim is made that environmental consciousness in the UK and Germany is manifest through the increasing availability of environmental knowledge in relation to risk and heightened public concern (Eurobarometer 1992, IPOS 1992, 1994). It can be argued that this concern is observable through the thematic priority given to both anthropogenic and natural environmental disasters by the media and is also evident through the general public demand for greater transparency and accountability in the engagements of industry. Directive 90/313/EEC widens the range of industrial data on emissions and installation usage that companies are

obliged to release to state authorities and which can be accessed by the public from such authorities. The removal of the veil of industrial secrecy encourages firms to adopt open environmental dialogue with the public in harmony with ISO 14001 and EMAS operation. Furthermore, the nature of institutional dissemination and disclosure of environmental information will inform the exercise of and commitment to corporate environmentalism prescribed by environmental management systems.

4.3.2 Waste Management

According to Directive 91/156/EEC, which provides the definition of waste cited in S. 75 of the UK EPA and German §3 *KrW-/AbfG*, wastes are identifiable and categorised as moveable objects which the owner disposes of, wishes to dispose of, or must dispose of. This is a significant advance on previous definitions of waste in that 'disposal' or the 'desire of disposal' refer to the subjective aspects of waste, whilst 'having to dispose' refers to the objective aspect of the waste concept. Consequently this regulation redefines the number of items which qualify as waste and, by extension, the range of items which are subject to the waste law. This revision extends the boundaries of the waste concept in the sense that criteria are determined according to which the 'desire to dispose' are understood, regardless of whether an owner of an object intends to dispose of it or understands that the object constitutes waste (in response to the difficulty differentiating between 'waste' and 'economic material'). An object which has been discontinued or whose purpose is fulfilled by another item, is now also a legally defined object of waste. The modification of the waste concept results in a redefinition of 'waste' and 'the product'. The concept of the 'product' also contains items, in the sense of by-products or subsidiary materials which can be utilised and marketed. The objective waste concept refers to items which can no longer be used according to their original purpose and on the basis of their material structure are likely to constitute a future environmental danger and whose danger potential can only be eliminated by harmless processing or in keeping with measures prescribed by legislation.

Although both UK and German legislation have enshrined the above definition in law the practical inferences that it implies are currently less apparent in UK waste management legislation than is the case in German legislation. Approaches to 'waste care' and the treatment of hazardous waste have much in common in the UK and Germany, whereby any person who imports, produces, carries, holds or disposes of wastes[53] are legally obliged to prevent unauthorised disposal, fugitive waste and secure waste transferral through defined procedures. Inattention to or wilful transgression of waste duties is punishable by fines or imprisonment[54]. The point of conceptual departure between the UK and Germany can be traced to the lack of meaningfully reworking of the legal narrative which provides the basis for the new waste concept in UK legislation. In contrast, the German *Kreislaufwirtschafts- und Abfallgesetz* (*KrW-/AbfG*) has evolved to accommodate new understandings of waste. '*Kreislaufwirtschaft*' alludes to the centrality of material and its transformations in modern economies[55]. In this study '*Kreislaufwirtschaft*' has been translated with the term 'Eco-Cycle'. It is felt that this term aptly portrays the indivisibility of ecological and economic intercourse borne out of ongoing social production. The central aim of the *Kreislaufwirtschafts- und Abfallgesetz* (Eco-Cycle and Waste Law) is to close the material and functional processes delineating production and disposal by encouraging:

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53 'Controlled wastes' which may be 'hazardous' in the UK legislative context, and *Abfälle zur Verwertung*, *Abfälle zur Beseitigung* or *Sonderabfälle*, which may be '*überwachungsbedürftig*' in the German legislative context.

54 S. 34. Part II of the EPA 1990 and the *Kreislaufwirtschaft und Abfallgesetz* imposed on all persons in the waste chain to ensure that: waste is not illegally discarded or in breach of a licence or handled in a way that could cause environmental damage; waste does not escape from the control of the person responsible for it; waste is transferred to an authorised person (ie, a local authority, a registered waste carrier, licensed disposer); transferred waste is handled by appropriately registered waste carriers and through the mandatory system of signed transfer notes alongside each consignment of waste and additional details (addresses, waste source, volume, dates of transfer, etc) as specified in the Environmental Protection (Duty of Care) Regulations 1991, Waste Management Licensing Regulations 1994. In the case of the *KrW-/AbfG*) waste is transferred to an authorised person (ie, public-law parties defined by the respective *Bundesländer*, a registered waste carrier, licensed disposer (§§13-18)) and is handled by appropriately registered waste carriers (§§49 and 50), the relevant details on each consignment of waste and additional details (addresses, waste source, volume, dates of transfer, plant details, etc) in relation to §39 and the *UStatG(1994)*. Industrial or commercial waste producers of owners have the additional duty of care to pursue waste recycling and energy recovery options before waste disposal (§5). "Waste for disposal" should be treated and stored differently from "waste for recycling" (§11).

55 According to the first law of thermodynamics energy within a closed system remains the same, even if chemical energy is changed into heat, then into a mechanical energy and again into electrical energy. The consequence for the economy is that all forms of production and consumption only represent transformations and conversions of energy from states perceived to have no human usage to states which have utility value.

- waste avoidance and minimisation behaviours;
- ecologically-oriented and resource-friendly products;
- heightened environmental quality.

It is envisaged that these environmental developments will positively impact product quality and costs. Government sponsored projects examining the economic relations between product creation and waste also foster the push towards institutionally-driven ecological modernisation[56]. The notion of 'waste responsibility' has been further stimulated through European Directive 94/62/EC.

One notable difference in the operation of packaging waste strategies of the UK and Germany is the inclusive participation of German industry, including SMEs, in waste packaging collection and processing, whilst packaging obligations for UK SMEs apply where an enterprise handles more than 50 tonnes of packaging annually and generates a yearly turnover of more £1 million. Prior to the year 2000 the turnover requirement for participating UK companies was £5 million per annum. Therefore, in terms of numbers, UK companies have had less reason to re-evaluate their relations with packaging waste. Difficulties have been reported in the operation of UK waste packaging recovery. The UK's market-based approach to tackling packaging waste has centred around the trade in Packaging Waste Recovery Notes (PRNs) sold to reprocessors although insufficient funds have so far been recovered from PRN sales for investment in recycling projects or raising prices for collected materials (ENDS 2000a). In contrast, German experiences during the mid-1980s and early 1990s in relation to packaging waste collection have largely highlighted the problems of waste collection levels resulting in system overcapacities (IMO 1994; DSD 1994; DSD 1995). The finalised packaging targets

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[56] Pilot project of the *Bundesforschungsministerium* concerned with outcomes of strategic aspects of the Eco-Cycle and Waste Market and its specific application ("*Strategische Aspekte der Kreislauflaufwirtschaft und Beschreibung spezifischer Handlungsfelder*"). In the UK extensive and successful innovative ecologically-oriented research has been and will be conducted. The point emphasised here is that German research projects have been conducted within a socio-economic and legislative framework which has purposefully stimulated competitive advantage through environmental and ecological invention. Refer to Appendix C, Tables C.5 to C.8.

set in the EC Directive 94/62/EC during 1996 were not endorsed by a few Member States, including Germany, in view of what was perceived to be a weak appliance of the *Vorsorge* and polluter pays principles. Objections were raised against the waste avoidance, recovery and recycling targets which were lower than targets presented in original package waste discussions (SRU 1996). Germany exercised its right to introduce higher waste targets[57], a move which is indicative of relatively higher levels of packaging waste management endeavour in the country and the pressures placed on industry to respond to the demands of ecological modernisation.

The UK enterprise response to 'product responsibility' commitments can be described as mirroring the legal development of the UK National Waste Strategy. Although it is accurate to point towards this strategy as embodying product responsibility this is a generous explanation given that 'product responsibility' refers to defined and practised policies in relation to product dematerialisation and valorisation. SME commitment to the above is likely to remain fluid until the UK National Waste Strategy is itself fully developed or at least more directly implicates SMEs in its policy objectives[58]. German legislation also affords the *Mittelstand* or

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57 The UK target for years 2000 is 40% recovery and 13% recycling by material; from 2001 50% recovery and 16% recycling by material. The German target is a minimum of 50% recovery, although 65% of packaging waste recovery is anticipated. A minimum of 25% recycling by material is to be accepted, although 45% recycling by material is anticipated.

58 The European Commission decided in to take the UK to the European Court of Justice (EJC) in 2000 for its failure to prepare waste management plans required by EU Directives 91/156, 91/689/EEC and 94/62/EC. The framework Directive on Waste Management required Member States to define one or more waste management plans, including disposal sites, technical requirements and quantitative and qualitative aspects of waste. The Hazardous Waste and Packaging Directives specified additional requirements for National Waste Strategies. In its defence the UK Government claimed that the consultative draft waste strategy would satisfy the demands of these Directives. However, as reported in ENDS (2000c), it is unlikely that the Court would be satisfied with copies of even documented waste strategies in the absence of their operation. The UK has also been penalised for its failure to implement the European Waste Catalogue as defined in Directive 94/3/EC. Criticism of existing German waste legislation has been voiced by environmental policy commentators and environmental activists. One area of concern is the absence of delineation between waste for processing and waste for disposal in clearly defined categories. It is felt that more detailed instructions clarifying wastes, products, defining product responsibility and take-back obligations would eliminate violations of the *KrW-/AbfG* through false declarations. More detailed instructions which identified priority waste streams would provide waste collection with a direct focus. Also, uniform waste categories at the *LAGA* level would remove the possibility of inconsistent regional waste categorisations. Further criticism levelled at the *KrW-/AbfG* and waste policy is that is currently too influenced by market forces. In contrast to the UK waste strategy which is market force-led (ENDS 2000a) it is feared that deregulatory developments and voluntarism will offset consistent and ecologically defined control of waste. More influential legislation would stem market force imperatives and the formation of waste mountains created by the lack of their control. Despite the procedural efficiency of the *VerpackV* it has been criticised for not being governed by environmental instruments which either maintain or stimulate greater use of reusable beverage packaging and containers. For a more detailed review refer to Öko-Institut (1998) and the DPU (1996).

German SMEs access to the materials and recycling market in ways which do not currently exist for UK SMEs. Despite the characteristically large financial and technical resource overheads warranted in recycling enterprise *Mittelstand* companies have been encouraged to enter the *Kreislaufwirtschaft* through cooperative "Autonomous Merger Structures" ("*eigenständige Zusammenschlußformen*")[59] to secure economies of scale peculiar to larger companies. In the context of waste disposal markets cooperative formations are able to engage in larger scale material collection, selection and processing. Recycling tasks can be flexibly undertaken and material streams more favourably exploited.

German waste law encourages direct input-output-relations between different manufacturing firms through the *Drittbeauftragung* (Commissioning of Third Parties) outlined at *KrW-/AbfG* §16 and licensing conditions at *KrW-/AbfG* §§ 48 to 52. According to §16(1) producers or owners of waste can commission a third party, in practical terms, a Waste Disposal or another manufacturing company, to contractually assume responsibility for waste produced. The contract will guarantee that the waste producer and waste owner have conformed to all legal requirements relating to the nature and proposed processing of the waste. However, this legislation does not fully transfer material responsibility from the waste producer or waste owner to the third party at the point of waste transfer. Thus in order to avoid liability the waste producer or owner is committed to supervisionary responsibilities over the selected third party until materials have been legally managed or processed (*KrW-/AbfG* §16(3)). Article 17 of the *KrW-/AbfG* outlines the waste-specific, sectoral, regional associations which can be formed between enterprises. The net effect of this regulation is to encourage material and cost efficient opportunities to manage waste and product streams as defined by industrial

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59 These structures enable participating partners to remain legally independent but voluntarily concentrate their relative economic autonomies in order to realise technical and economic advancement in given fields. Each enterprise exercises the same legal rights and stand in equal legal relation to each other. Refer to the publication entitled "*Unternehmenszusammenschlüsse*" written in 1981 by W. Schubert and K. Küting for more information on Autonomous Merger Structures.

enterprise within the parameters of waste legislation. It is envisaged that modifications to the *KrW-/AbfG* will stimulate distinct financial opportunities which could not be fully exploited prior to legislative modifications and in view of waste disposal overcapacities created during pioneering waste legislation. According to Guderian, Pflaum and Kümmel (1997) the formation of Virtual *Mittelstand* Enterprises has been particularly suited to conducting such combined business strategies[60].

The practices of German industry accord with planned Directives addressing primary waste streams[61] which will require enhanced ecological product design to improve product reparability, upgradability and re-use as well as recycling capacities. These likely developments do not bode well for manufacturing industry which is poorly prepared for the legal and competitive implications of extended product responsibility.

4.3.3 Integrated Pollution Prevention and Control

Integrated pollution prevention and control is a key feature of the sustainable development strategy promoted by the Fifth Environmental Action Programme. Prior to the adoption of the Directive 96/61/EC, a legal framework for authorising air emissions was established on the basis of Directive 84/360/EEC and the control of discharges into the aquatic environment was provided by Directive 76/464/EEC, but no corresponding legislation directly addressed the impact of soil emissions. It was therefore possible for pollution levels to shift between the air, water and soil without

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60 The term "virtual enterprise" refers to a flexible network of legally independent enterprises which combine their resources under an umbrella organisation which shares functional management competance. In contrast to an *Unternehmenzusammenschluß* the virtual company appears and behaves as if it were a large company in relation to its customers and suppliers. An early example cited by Guderian et al (1997) is the company LOGEX System GmbH & Co KG, which was founded in 1993. This virtual company united thirty-three small and medium-sized Waste Management Operators to provide specialist waste solutions. In addition to acquiring the control of further material processing chains the company offers consultancy and support in new methods of material processing the marketing of products made of secondary materials.

61 One such Directive in draft stage concerns waste electrical and electronic equipment. This Directive will provide incentives to reduce the number of waste electrical and electronic appliances and promote the re-use and recycling of waste in addition to reducing the environmental impact of waste through the use of dangerous substances, compounds and plastics (COM 2000). Another is the draft EU Directive on disposing of and recycling EOL vehicles. The Directive will provide the first formal setting for the principle of manufacturer liability for taking back cars once they have reached the end of their use as vehicles. This principle will also be employed in the Directive on Electrical and Electronic Waste (COM 1999).

securing improvements to the environment. The framework established by the IPPC Directive considers the impacts of pollution and waste throughout all environmental media in a holistic fashion in order to reduce adverse environmental impacts. To ensure that pollution is more effectively prevented and contained the IPPC Directive specifies emission limit values and parameters based on BAT principles. These are to be applied to listed activities which the competent authorities in each Member State are to adopt and enforce. It is anticipated that co-ordinated authorisation procedures between competent authorities throughout the Member States will enable consistent as well as high prevention and protection standards to be maintained in the environment as a whole. What becomes apparent through the review of EU environmental legislation and its national transposition is consistency in standard application is not synonymous with uniformity of emission and discharge values; emission and discharge limits set by the Commission have been designed to accommodate the multiple geographies of a Member State[62]. The term '*Integrated* Pollution Prevention and Control' is significant in that it refers to a body of regulation which singularly addresses conventional environmental media, and not because it defines homogenous emission and discharge limits to air, noise, water and land. It is also significant as a body of regulation which defines the form and detail of information required of competent authorities and from permit holders. Information requirements will include the nature of BAT disseminated from competent authorities to companies and the quality and regularity of information conveyed from competent authorities to the European Commission[63].

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62 Article 9(4) of Directive 96/61/EC states that although emission limit values, parameters and technical measures will be based upon BAT, the definition of BAT will be influenced by the "technical characteristics of the installation concerned, its geographical location and the local environmental conditions" and therefore anticipates intra-regional alongside regional differences between authorised permit specification requirements. Qualifying the variable emission limit values between Member States is the provision of information exchange between Member States in relation to permit requirements and BAT applied in respective industries (Article 16(2)). Also, Member States likely to be affected by transboundary emissions can request permit application details of all companies practising in neighbouring Member States from the respective information authority(ies) (Article 17) to guarantee equivalence in environmental practice.

63 Member States need to undertake measures to ensure that competent authorities are equipped with the resources to regularly monitor emissions and discharges, conduct installation inspections and furnish operators with the information required to comply with permit conditions (Article 14). Member States also need to introduce measures to ensure that installation information requirements, in keeping with Directive 90/313/EEC, are (i) maintained and made available to the public, (ii) conveyed to the European Commission, which will publish an inventory of the key emissions and sources at 3-year intervals (Article 15).

4.3.3.1 Implications of Directive 96/61/EEC on Existing Legislation

The changes imposed on UK and German legislation by this Directive are primarily structural and procedural in nature. A comparative review of current UK and German legislative frameworks indicates that UK environmental legislation is likely to undergo lower levels of structural change and higher levels of procedural change than corresponding German legislation. Three reasons can be cited for this view. The first reason is that the IPPC Directive is conceptually similar to the UK IPC system[64]. The second being that UK regulators will be obliged to account for a wider range of environmental impacts before the issue of a permit. Consequently noise, vibration, waste minimisation, energy efficiency, the use of raw materials, accident prevention and site restoration (soil and ground water contamination) are included under IPPC regulation. German environmental legislation already extensively uses BAT whilst its use is optional in corresponding UK legislation. The third important reason is that the UK environmental information culture has been largely voluntaristic with less prescription compared with the German experience.

Given that BAT has played a more central role in German environmental legislation, industrial practices have been configured by its requirements. Effective use of BAT equally involves advanced methodological and technical approaches, which in turn are reliant upon the maintenance of high skill levels and training dictated by the ongoing revision of environmental quality standards. Subsequently the use and engineering of the highest quality technology craft became a prerequisite of industrial practice. The maintenance of high quality industrial standards in Germany can be described as the product of state-driven legal dynamics, the by-product of which has been comparatively high compliance burdens carried by

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64 The restructuring of German environmental legislature began in 1992, resulting in the prototype *Umweltgesetzbuch* (*UGB*) - the Legal Manual of the Environment, completed in 1997 which conceptually mirrors IPC legislation . An important and additional objective of the *UGB* was/ is to introduce greater uniformity and clarity to incremental environmental legislation borne out of an increasing environmental consciousness. The first Legal Manual of the Environment (*UGB I*) was completed by the *Bundesumweltministerium* in April 1999 but after protracted consideration its implementation was shelved in view of a range of primarily legal complications in relation to both German national and European Union legislative provisions, including the need to effectively codify Directive 96/61/EC into German legislature. For more information refer to "*Umweltgesetz-buch: (UGB-KomE)*", *Entwurf der Unabhängigen Sachverständigenkommission zum Umweltgesetzbuch beim Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit*, published by Dunker und Humblot, in 1998 and SRU (1999).

companies subject to German law[65]. In contrast, normative requirements in UK legislation have been less exacting, but enforced UK conformance to BAT is likely to prompt modifications in industry behaviour which are normally more closely associated with company changes observed after the adoption of Management Systems[66]. Increases in compliance costs for industrial enterprises as a whole, with implications for SMEs in particular, will also result from the additional information all UK companies will be obliged to provide competent authorities. The Access to Environmental Information Act 1999 stipulates that additional details on prescribed hazardous preparations and substances were made available to the authorities and public but as previously implied the scope of Directive 96/61/EC transcends the interpretations of previous UK legislation, even including current formulations in the Pollution Prevention and Control Act[67].

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65 Regulatory compliance and associated costs are adjudged to be more extensive and higher for German than for UK enterprises (Raines et al 1999; OECD 1999; Nickell 1997; Grubb and Wells 1993; Bannock and Albach 1991). This assessment is perhaps not surprising in view of (West) Germany's post war statist-interventionist experiences and the comparably liberal market economy of the UK, in which voluntarism has been a favoured ally of the state (Gospel and Palmer 1993, Nickell 1997, Randlesome 1994). The level of compulsory, unpaid bureaucratic State-defined duties performed by German industry has provoked enduring calls for deregulation, particularly by organisations representing the *KMU* such as the *Bundesverband mittelständische Wirtschaft* (BVMW) (The Federal Association for the Small Firm Economy) (Vogel 1997). Strategies to correct perceived 'bureaucratic overload' have been crystallised by the *der Sachverständigenrat Schlanker Staat'*(Lean State Expert Committee), and formulated into principles to guide ongoing legislative amendments which promote regulation reduction. However, criticism of bureaucratic tendencies of Germany and the desire to loosen industrial regulation is tempered by widely held appreciation of the socio-economic benefits these bureaucratic conventions create (BMWi 1996). Refer also to OECD Report (OECD 1999) concerning industrial regulatory frameworks and compliance costs.

66 The extent to which BAT ultimately underpin a high quality ethic will depend upon the latitude Member States have to define what they are. Directive 96/61/EC does not specify the ultimate arbiter of a definition and equally suggests a flexibility which could undermine its effective practice. According to Article 9(4) the BAT definition provided in Annex IV of Directive 96/61/EC will be further qualified by the technical characteristics of a specific installation, the geographic location of an installation and local environmental conditions. These factors can influence the cost-benefit assessment built into the BAT concept.

67 Annex I of Directive 96/61/EC specifies the new installation requirements for the interconnectivity of installation processes. Previous installation requirements were defined by Directives such as 84/360/EEC, 88/77/EEC, 89/369/EEC, 89/429/EEC, 91/414/EEC. New installations would require IPPC permits whilst existing installations would require IPPC permits, as determined by the nature of the installation, from the year 2000. Installations requiring two or more IPPC related activities would be subject to the earliest scheduled IPPC installation dates. Listed IPPC installations only account for those installations described as IPC installations and some described as LAPC installations under the EPA, currently described as low impact installations. The Environmental Protection (Prescribed Processes and Substances) Regulations list prescribed processes for integrated pollution control (Part A) and those subject to control of air pollution (Part B). Some processes listed under these regulations have been exempted from authorisation, such as pig and poultry installations, firms in the metal industry and the food, drink and dairy industry. However IPPC legislation does not exempt installations from authorisation on the basis of comparative lower environmental impact or industry. This will result in an increase in the number of installations requiring authorisation permits. Comparatively minor modification to *BImSchG* (§3(5); *WHG* (§18b(1-2), §18c); *KrW-/AbfG* (§31(1)) will be required in order to accommodate the range of installations and processes listed in Annex I of Directive 96/61/EC. In line with the definition of installation provided by Directive 96/61/EC, prescribed installations under the *Umwelthaftungsgesetz* are defined as those which, despite not satisfying specified size or emission limits, are spatially or functionally connected with those installations which are prescribed or, in combination with other installations, fall within specified installation size categories or emission limits (Annex I (1(3)) of the *Umwelthaftungsgesetz*).

4.3.4 Environmental Liability Law (*Umwelthaftungsgesetz*)

Attention is now given to the German Environmental Liability Law (*Umwelthaftungsgesetz (UmweltHG)*) which has no precedent in UK legislature. The *UmweltHG* supplements traditional liability law operative in German legislature[68]. Article 1 of the *UmweltHG* describes liability as being related to an environmental impact in connection with one of a range of specified installations or facilities which results in death, physical injury, impaired health or damage of an object. The owner of such a facility is obliged to compensate for the resultant damage[69]. The *UmweltHG* is concerned only with damages caused by company facilities listed in an associated Annex and operates on the basis of strict liability. Emissions associated with environmental damage originate from materials, vibration, noise, pressure, radiation, gases, vapour, heat and similar effects, which is released onto land, into the air or water. Consequently the facilities and installations associated with environmental damage include operating plants and premises used to store or deposit materials which might cause emissions alongside machines, vehicles and other equipment used in production processes. What differentiates the *UmweltHG* from other forms of liability law is the location of liability. Establishing environmental liability is not dependent upon the faulty operation of a facility or the breach of a civil or administrative duty of care; proof that environmental damage was caused by a facility is the only requirement to record liability, regardless of whether the facility operator satisfied BAT criteria[70].

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[68] The most important environmental criminal legislation is held in the *Strafgesetzbuch* (*StGB*) under the heading "*Straftaten gegen die Umwelt*" (§§ 324-330d). Included is legislation from the *WHG*, *BImSchG*, *KrW-/AbfG* and *BNatSchG*.

[69] "*Wird durch eine Umwelteinwirkung, die von einer im Anhang 1 genannten Anlage ausgeht, jemand getötet, sein Körper oder seine Gesundheit verletzt oder eine Sache beschädigt, so ist der Inhaber der Anlage verpflichtet, dem Geschädigten den daraus entstehenden Schaden zu ersetzen.*" §1 *UmweltHG*. §§12-15 of *UmweltHG* specifies that in the case of death, funeral costs should be covered and financial support provided to third parties or legal dependants of the deceased through a pension. Where the plaintiff has suffered bodily damage or impaired health, compensation covers recuperation costs, disadvantages ensuing from additional needs resulting from injury or resulting employment handicaps. Liability sums of up to 160 million DM for personal or material damages can be received in accordance with the degree of environmental damage and nature of its cause. Proprietors of plant operations and facilities listed in Annex II are required to provide themselves with additional liability insurance to cover potential reparation obligations (§19) *UmweltHG*.

[70] According to §§ 6 and 7 of the *UmweltHG* the damaged party must be able to prove that the actions of a given facility caused the considered environmental violation. §6(1) *UmweltHG* requires that the plaintiff provides an inversion of the burden of proof, whereby a very strong likelihood of causality would suffice to prove liability rather than definitive verification dependent upon scientific expertise. The defendant could then counter this evidence by pursuing (one of) four strategies: (i) the defendant could attempt to prove that the legal offence had occurred

UmweltHG liability is also associated with development risks which were not or could not have been recognised at the point of damage which can be defined as a polluter liability.

In contrast to the danger liability of §22(1) of the *WHG*, the *UmweltHG* has a limited focus[71]. It is also less extensive than the *WHG* in its violative scope given that the range of liable facilities are prescribed in legislation and offers less opportunities for compensation than the *WHG*. However, the qualitative impact of the *UmweltHG* on plants and facilities is greater since the law is not dependent upon proof of blame or tortious behaviour.

The installation liability list in Annex I of the *UmweltHG* comprises installations drawn from the *BImSchG* and the *KrW-/AbfG* requiring licences and permits[72]. However, the inclusive nature of this list determines that its scope is much wider than the listed operating plants and facilities requiring permits through the Environmental Protection (Prescribed Processes and Substances) Regulations and the Waste Management Regulations. Although liability exemptions are granted to certain units on the basis of size, 'departmentalising' prescribed processes will not offset liability since the legal definition of installations is determined by their proximity and functionality in relation to processes as well as size and emission

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during normal operations without aberration, as defined at §6(2), which would invalidate the claims postulated at §6(1); (ii) the defendant could attempt to prove that another factor or factors caused the environmental violation; (iii) the defendant could attempt to prove that the facility was inoperative at the time of the alleged offence; (iv) the defendant could demonstrate that the alleged offence had occurred beyond ten years since the claim of damage had been made.

71 §22 of the *Wasserhaushaltsgesetz* (*WHG*) is concerned with liability related to changing the physical, chemical or biological property of water, where water is defined as surface waters, coastal waters and groundwaters (§1 *WHG*). Two broad forms of damage to waters require compensation from offenders. One involves the introduction or discharge of a substance by an individual or a group into a body of water which affects a body of water to the extent that the physical, chemical or biological properties of that water are changed (§22(1)). The second involves the discharge of unauthorised substances from an installation into the body of water. Under such circumstances the proprietor is obliged to compensate to the affected parties for the damages caused, where the damage is not the result of a 'higher force'. Similarly, under the Water Resources Act a person or group contravenes the law by consciously permitting the release of any matter, other than trade effluent or sewage effluent to enter controlled waters, resulting in a polluting offence (WRA Part III, S.86(1) or permits the discharge of trade effluent or sewage effluent in breach of the conditions attached to such a discharge (WRA Part III, S.85, S.86(2-6). Equally, a person will not be considered guilty of an offence under Section 85 resulting from a *force majeur* in order to avoid danger to life or health (S.89(1a)). However, a person may also escape liability if all reasonably practicable steps are taken to minimise the extent of the discharge and its polluting effects or the nature of the entry or discharge is conveyed to the competent Authority as soon as is reasonably practicable (WRA S.89(1b-4).

72 §§3-7 *BImSchG*; §§ 31, 41, 43, 46 *KrW-/AbfG*. Refer to Annex I and II of the *UmweltHG*.

values[73]. Generally speaking environmental impacts are released from equipment or a facility whilst performing as part of company operations. However, §2 of the *UmweltHG* extends the time scale of corporate liability in relation to its facilities, so that it covers the period from its construction through to the point that the facility has its ownership transferred or is closed down. Liability in this instance is again related to proving that the suffered environmental impact can be attributed to the facility during the period post construction and pre-closure[74].

According to §1 of the *UmweltHG* the proprietor of the facility is obliged to compensate the damaged party. The legal definition of the proprietor in relation to liability is not specified in the *UmweltHG* itself but drawn from existing regulation such as the §2 of the *Haftpflichtsgesetz* (*HaftPflG*) and §22 of the *Wasserhaushaltsgesetz*. The proprietor is normally defined as the user who exercises the right of disposal over the plant and provides the costs of its maintenance. Therefore, it is the 'economic' proprietor of the facility and not necessarily the legal owner of the facility who would be subject to a liability order. Where there is a change of ownership or defined environmental impacts have proven not to be the responsibility of an exclusive proprietor, liability will be shared amongst the 'causing polluters'[75]. Circumstances mitigating liability include those where a violation has a relatively benign impact on the affected environment, whilst damage caused by a *force majeur*, which is unlikely to warrant compensation.

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73 "*Mehrere Anlagen eines Betreibers, die die maßgebenden Leistungsgrenzen, Anlagengrößen oder Stoffmengen jeweils allein nicht erreichen, sind Anlagen im Sinne des §1 UmweltHG, sofern sie in einem engen räumlichen und betrieblichen Zusammenhang stehen und zusammen die maßgebenden Leistungsgrenzen oder Anlagengrößen (Nummer 1) oder Stoffmengen (Nummer 2) erreichen.*" Legislative Appendix I (3) in relation to §1 of the *UmweltHG*.

74 "*Geht die Umwelteinwirkung von einer noch nicht fertiggestellten Anlage aus und beruht sie auf Umständen, die die Gefährlichkeit der Anlage nach ihrer Fertigstellung begründen, so haftet der Inhaber der noch nicht fertiggestellten Anlage nach §1. Geht die Umwelteinwirkung von einer nicht mehr betriebenen Anlage aus und beruht sie auf Umständen, die die Gefährlichkeit der Anlage vor der Einstellung des Betriebs begründet haben, so haftet derjenige nach § 1, der im Zeitpunkt der Einstellung des Betriebs Inhaber der Anlage war.*" §2 (1),(2) *UmweltHG*.

75 §830 (1) *Bürgerliches Gesetzbuch (BGB)*.

4.3.4.1 *Umwelthaftungsgesetz* and Environmental Liability

Certain observations can be made about the *UmweltHG* and its impact. The use of strict liability removes the requirement for establishing environmental fault and elevates causality in relation to environmental damage as the defining factor of environmental liability. One of the immediate effects of the law is the creation of increased legal risks with direct and indirect cost implications for manufacturing companies in particular. Direct costs relate to those encountered through installation and machinery upgrades in order to contain adverse environmental site developments. Indirect costs may include insurance premiums defined by the nature of company processes. A 'weakness' of the *UmweltHG* is its exclusive focus on prescribed installations and facilities without accounting for the direct use of environmentally hazardous materials or products. This distinction may have significant competitive advantage or disadvantage implications for companies, the outcomes of which will indicate the ecological worthiness of this instrument in its current form. Since liability is defined by size as well as installation functionality many smaller *Mittelstand* companies are not covered by its pronouncements. One of the current justifications for excluding a product liability dimension from the *UmweltHG*, which would undoubtedly increase its application span, is likely to be the competitive advantages this would provide foreign enterprises over German enterprises if such legislation was not uniformly introduced. Also, as previously discussed, environmental liability conceptually accounts for general environmental damage to biodiversity, which is not included in the *UmweltHG*. This omission is the consequence of environmental liability being executed via the *UmweltHG* in relation to established individual damage. Despite these current omissions the *UmweltHG* represents an important development in the practice of environmental liability law and applied extension to the polluter pays principle. The law has arguably prompted affected German enterprises to revisit corporate issues entailing environmental risk with a similar vigilance generated amongst companies seeking EMS certification or verification. Companies operating Environmental Programmes

as outlined in an EMS will equally use these to guarantee that environmental objectives satisfy all revised legal and corporate terms[76].

[76] Refer to Chapter 5.1.3 on Environmental Programmes and Performance Evaluation Indicators.

5 CORPORATE ENVIRONMENTAL COMMITMENT AND ACTION

The aim of Chapter Five is to apply the theoretical insights into corporate environmental commitment and action discussed in Chapter Three in corporate settings in which environmental management is introduced. This will involve an examination of the Eco-Management and Audit Scheme alongside ISO 14001. Reference to these particular environmental management systems is justified on the basis that they represent regulatory frameworks for enterprises committed to environmental change with common functional elements. The following Chapter will consider common aspects of each system alongside their particular philosophical emphases. Through a comprehensive description of the ISO 14001 standard and the Eco-Management and Audit Scheme it should become apparent how and why:

(i) Environmental Management Systems encourage orderly environmental change and ecological cohesion by addressing the conflicting impulses of industry and its impacts through social production;

(ii) Environmental Management Systems can be described as normative devices through which the fundamental environmental values of different social systems and their subsystems are applied.

Figure 5 1: Structure and Stages of EMAS/EMAS-II Regulation

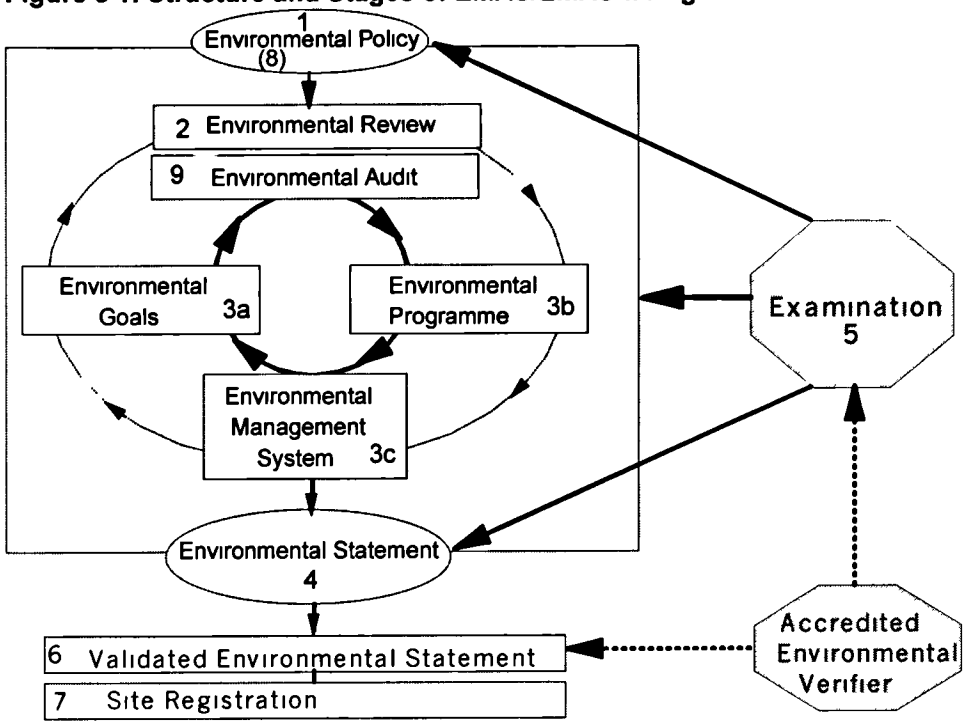
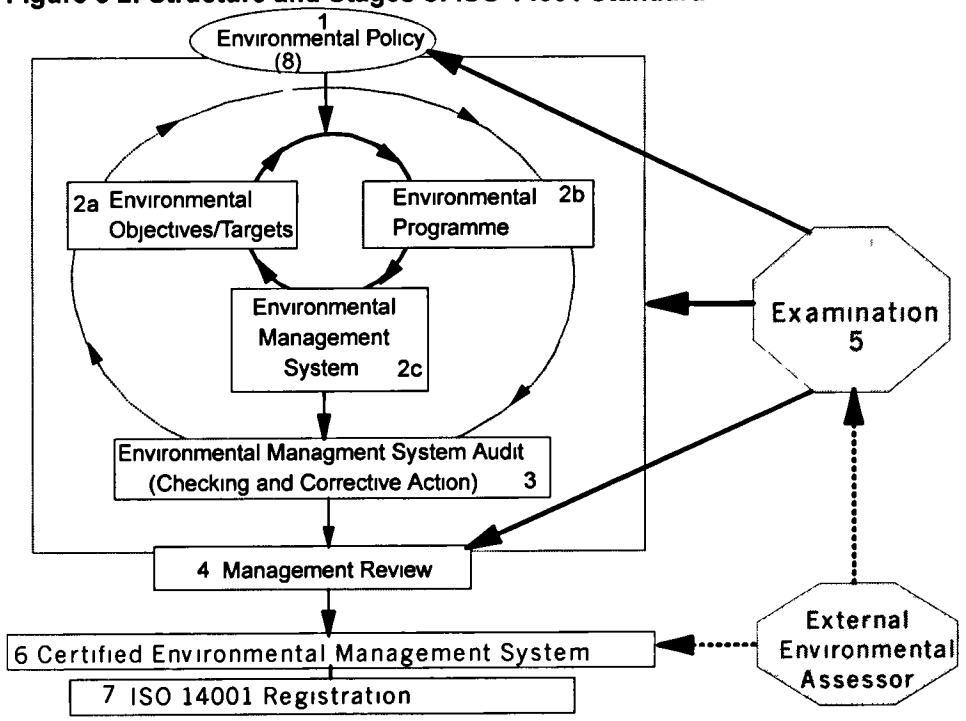


Figure 5 2: Structure and Stages of ISO 14001 Standard



5.1 The System Elements of EMAS and ISO 14001

The structure and stages of EMAS and ISO 14001 are outlined in Figures 5.1 and 5.2. Since all companies with a verified EMS were registered under EMAS for the purposes of this thesis, primary examination of Eco-Management and Audit Scheme regulation has been based upon Council Regulation EEC 1836/93, which is functionally identical to Council Regulation EC 761/2001[77]. The objectives, structure and requirements of EMAS and EMAS-II are outlined in Appendix C.1. ISO 14001 defines the guidelines for the creation of an environmental management system to assist an organisation in the realisation of its environmental aspirations. The ISO 14001 Specification is outlined in Appendix C.3.

5.1.1 Environmental Policy

Devising an Environmental Policy is cited as the first formal development within an EMS. However, the importance and scope of the policy document spans all factors of corporate environmental management. It is the primary vehicle of environmental improvement in companies, functioning as a symbolic contract between top management and employees, corporation and the public. Company environmental objectives and targets are alluded to through statements on environmental compliance and improvement strategies found in the Environmental Policy. Ideally the Environmental Policy will contain defined management commitment to improvement, which will ensue from the existence of a systematic approach to environmental housekeeping. However, the ISO 14001 standard does not itself prescribe the mode of environmental reforms. The term 'improvement' in the context of ISO 14001 is unqualified and can, therefore, be interpreted in line with

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77 Five key revisions have been made to the Eco-management and Audit Scheme under EC Regulation No 761/2001: (i) the scope of EMAS has been extended to all economic sectors (Article 3), (ii) the ISO 14001 environmental management system is now adopted into the EMAS regulation (Annex I), (iii) a distinct EMAS logo allows registered organisation to more visibly publicise their environmental commitment (Article 8; Annex IV), (iv) there is greater provision for employee involvement in EMAS implementation (Annex I.B.4), and (v) more emphasis is placed on improving the efficacy of the Environmental Statement as a medium of the transparent communication of corporate environmental performance between registered companies and their external stakeholders (Annex III). Existing elements of the EMAS scheme demand a more rigorous assessment and demonstration of environmental performance than ISO 14001; the consideration to further emphasise the role of employees and stakeholders alongside substantive performance improvements through EC Regulation No 76/2001 will be welcome by those keen to further enhance the ecological dimensions of EMAS.

the specified objectives of the Environmental Policy developer. A company may choose to adopt lines of action similar to those required for EMAS regulation based exclusively on BAT principles or conversely may isolate a particular company process for vigorous environmental investigation. Meaningful improvement should, however, fall within the context of a company's significant environmental impacts (BSI 1996a). The central elements of an EMAS Environmental Policy are:

commitment to legal environmental compliance;

commitment to the programme of continuous environmental improvement;

commitment to reducing negative environmental effects;

commitment to enacting objectives and targets listed in Annex I(C) in a way that specifically applies to the effective performance of the given enterprise;

commitment to enacting the duties described as 'Good Management Practices' in EMAS Annex I(D) in a way that specifically applies to the effective performance of the given enterprise.

The Environmental Policy should be completely addressed in the Management Review and thematically recorded in the Environmental Statement. In addition to their capacity as signatories, EMAS regulations recommends that the highest level of Company Management is essentially engaged in the composition, examination and periodic modification of the Environmental Policy in order to uphold good environmental management practices listed in Table 5.1, which are also explicit in the environmental responsibilities exercised in ISO 14001 (Annex A.5.3).

5.1.2 Environmental Audit

The methodology for Environmental Site Auditing in both EMAS and ISO 14011 is based on the Quality Assurance Auditing standard guidelines, ISO 10011, 1990, and these can be conducted either by company auditors or by an external body. The Environmental Site Audit process is divided into four stages, namely:

Table 5.1: Good Management Practices

1. A sense of responsibility for the environment amongst employees at all levels, shall be fostered.
2. The environmental impact of all new activities, products and processes shall be assessed in advance.
3. The impact of current activities on the local environment shall be assessed and monitored, and any significant impact of these activities on the environment in general, shall be examined.
4. Measures necessary to prevent or eliminate pollution, and where this is not feasible, to reduce emissions and waste generation to the minimum and to conserve resources shall be taken, taking account of possible clean technologies.
5. Measures necessary to prevent accidental emissions of materials or energy shall be taken.
6. Monitoring procedures shall be established and applied, to check compliance with the environmental policy and, where these procedures require measurement and testing to establish and update records of the results.
7. Procedures and action to be pursued in the event of detection of non-compliance with its environmental policy, objectives or targets, shall be established and updated.
8. Cooperation with the public authorities shall be ensured to establish and update contingency procedures to minimise the impact of any accidental discharges to the environment that nevertheless occur.
9. Information necessary to understand the environmental impact of the company's activities shall be provided to the public, and an open dialogue with the public should be pursued.
10. Appropriate advice shall be provided to customers on the relevant environmental aspects of the handling, use and disposal of the products made by the company.
11. Provisions shall be taken to ensure that contractors working at the site on the company's behalf apply environmental standards equivalent to the company's own.

Source: EU Regulation 1836/93, Annex I(D): Good Management Practices

(i) Initiation, (ii) Environmental Site Audit Execution, (iii) Formulation of an Environmental Site Audit Report, and (iv) Report Follow Up.

Environmental Audit evidence is formulated through evidence collected through consultation with employees, questionnaires, examination of company documentation, personal observation of activities and circumstantial evidence drawn from areas under audit. Errors and non-conformance highlighted by the environmental audit should be investigated regardless of whether they appear on the audit checklist. Information gleaned from consultation or questionnaires should be investigated through cross-referencing with independent sources (ie, personal or

other third-party observations and measurement). The Environmental Audit Report is produced under the direction of the Lead Auditor who is ultimately responsible for its detail and scope. The Audit Report must be a true rendition of the conducted audit and completed with the Lead Auditor's signature and the date of its completion[78]. Audit results in EMAS and ISO 14001 are presented to company management for consideration and review. The cycle of internal audits can be determined by company preference, but within a 3-year period of successful EMAS validation the environmental system is subjected to thorough re-examination and improvement through an internal Environmental Site Audit. The internal site audit precedes the environmental site examination to be conducted by the external accredited Environmental Verifier. Subsequent site visits of the external accredited Environmental Verifier will involve an assessment of Environmental Site Audits and modified Environmental Statements. Failure to conduct a full Environmental Site Audit by an external accredited Environmental Verifier within the time period of three years or non-compliance with the conditions of EMAS regulations may result in the loss of accreditation[79] and the subsequent loss of the right to use the EMAS logo. It is the external verifier's responsibility to ensure that all the requirements of the EMAS regulation are not compromised[80]. In the case of ISO 14001 an External Assessment will also take place within a 3-year period. The Environmental Assessor, who would ideally be an external, third party actor, will examine the

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78 Environmental Auditors are responsible for: (i) completing the audit demands, (ii) communicating and clarifying the audit requirements, (iii) effectively planning the performance of the audit responsibilities, (iv) documenting audit assessments, reporting audit results, (v) verifying the effectiveness of corrective measures the client is obliged to perform as a consequence of audit findings, (vi) safeguarding documentation in relation to environmental audits and issues of confidentiality in association with documentation, (vii) closely working with lead auditors and supporting audit team activities. Lead Auditors are responsible for: (i) all phases of the environmental audit, (ii) have suitable leadership skills and the relevant experience to make decisive decisions on the basis of audit findings. Included under lead auditor capabilities and responsibilities are the following: (i) team selection and team building skills, (ii) working through an audit plan, (iii) representing the audit team and drafting an audit report (EEC Regulation 1836/93, Annex II (E-G), EC Regulation 761/2001, Annex V).

79 EEC Regulation 1836/93, Annex III, Part B(b) indicates that non-conformance may not immediately warrant company de-registration. Where aberrations or weaknesses have been uncovered the verifier will discuss what changes are required by company management and the Environmental Statement will remain invalidated until suitable policy/programme/process amendments are made within reasonable time. Refer also to EC Regulation No 761/2001, Annex V, Section 5.4.3.

80 EEC Regulation No 1836/93, Annex II, Part C requires that the performing auditing team or auditor has the appropriate knowledge of the sectors and fields audited, including knowledge and experience on the relevant environmental management, technical and regulatory issues, and sufficient training in the specific skills of audting to guarantee the effective conduct of the audit. Equally the resources and time dedicated to the audit should reflect the audit scope and objectives. Refer also to EC No 761/2001, Annex V, Sections 5.2 and 5.3.

Environmental Policy and the EMS database. Of central interest to Assessors is the extent to which the portrayal of the entire EMS coincides with actual practices at work. If the examination is supportive of corporate environmental practice then certification and verification is granted.

5.1.3 Environmental Management System Structure and Responsibility

Environmental Management System structures are influenced by company size and the nature of existing management procedures and systems[81]. Defined personnel are directly responsible for the execution of each of the Environmental Programme objectives and each performed task is rooted in the upheld corporate values of the firm. Corporate environmental responsibility is inseparable from the ideological and instrumental aspects of law governing the use of environmental media. This is illustrated in Chapter Four where industrial operations and allocated corporate personnel responsibilities as a function of environmental legislation in the UK and Germany is discussed. Environmental Management Programmes facilitate the operational activities to be performed by the Implementation Team. Ideally programmes should be structured to enable clear identification of the completion time period and priority given to defined environmental tasks. The definition of programme tasks and responsibilities should flow from the structured evolution of the Environmental Policy and Review mapped by top company management. Within the planning framework a company will need to identify its environmental aspects and related impacts[82], legal requirements, and company objectives and

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81 The 'environmental management system' refers to the part of the overall management system that includes the organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy (EC Regulation No 761/2001, Article 2(k)).

82 ISO 14001 defines an environmental aspect as any organisational activity, product or service which can positively or negatively interact with the environment. By extension a significant environmental aspect is equally a manifestation of social production which "has or can have a significant environmental impact" (ISO 14001, Clause 3.3, EC Regulation No 76/2001 Annex VI). An environmental aspect is, therefore, not defined by the degree of its current affect but by its existence as a function of organisational activity. In an examination of environmental aspects, both positive and negative aspects should be included to form a full understanding of company operations. Without the identification of environmental aspects the control of environmental impacts and the related construction of quantifiable objectives and targets could not be satisfactorily conducted. An environmental impact is defined as any adverse or beneficial environmental change which results from organisational activity, products or services (ISO 14001, Clause 3.4, also in EC Regulation No 76/2001 Annex VI). An environmental impact is defined by the (quantifiable) environmental change induced by an environmental aspect. Environmental impacts are described as resource depletion, pollution and adverse human and ecological damage

targets[83], which fall within the Environmental Programme. The flexibility of the EMS reinforces the need for clearly defined boundaries of environmental engagement covered by the EMS at the outset and the importance of project planning direction from top management.

5.1.4 Environmental Management Review

The Environmental Management Review can be described as both the beginning and the end of an iterative cycle of processes within the EMS[84]. It is a strategic device through which systemic environmental deficiencies and strengths can be analysed by senior management and reconstructed to produce greater EMS and operational symmetry as well as corporate environmental improvement. This prescriptive and postscriptive function of the Management Review also serves to foster attitudes and behaviours which enable a quality EMS to become self-sustaining. One of the key tasks of the Environmental Management Review is to consider highlighting the company's environmental aspects in relation to current or future significant environmental impacts. The Review Body is pivotal in defining the human and material resources available to meet policy objectives. In addition to ensuring that qualified staff are suitably equipped to execute required tasks the Review Body must also ensure that procedures are in place which guarantee staff

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respectively. Other aspects include emissions and energy use, with impacts including the release of VOCs in the ambient air and the exhaustion of non-renewable resources, respectively.

83 Environmental objectives and targets are structured to satisfy the commitments of company top management expressed in an Environmental Policy. Environmental targets are quantifiable activities with defined outcomes which emanate from specific environmental objectives proposed by a company. As such they will be related to the significant environmental aspects and legal factors identified during the process of environmental review and environmental policy making. Effective formulation of environmental objectives requires an interrelated understanding of business aspirations and limitations (ie, financial, operational). Effective execution of environmental targets is dependent upon the careful formation of implementation teams (BSI 1996a). The centrality of top management in the process of environmental objective and target development increases the likelihood of project success. ISO 14031 provide guidelines on Environmental Performance Evaluation (EPE) which can be used to provide reliable feedback in terms of measuring progress against selected criteria and verifiable targets. In contrast to audits, which appraise system compliance within a specified time frame, EPEs furnish system assessment details throughout the life of the EMS in order to signal general performance status and performance levels in relation to objectives and targets. The content of EEC Regulation No 1836/93, Annex I(C) highlights the scale and scope of environmental measures which can be adopted by participants of the Eco-Management and Audit Scheme. Despite their quantifiability each measure offers some latitude in terms of their interpretation and execution, thereby allowing corporations inexhaustible opportunities to engage in forms of environmental improvement.

84 EC Regulation No 76/2001, Article 3.2(a) indicates that organisations which have a certified environmental management system recognised according to European or international standards need not conduct a formal environmental review when implementing EMAS-II if the necessary information for the identification and evaluation of the environmental aspects set out in Annex VI is provided by the certified EMS.

engaged in environmentally damaging activities are in receipt of requisite training. The Review would also monitor methods used to promote corporate environmentalism and the channels employed to communicate this philosophy throughout the business. This task will in turn involve the review of all documentation maintenance and environmental data audits. The Environmental Management Review would draw attention to ways in which new conditions, such as new legislation or products, may necessitate change which need to be reflected in EMS documentation and modified practices of environmental acceptability. The complete environmental contexts furnished by Environmental Reviews allow management to consider strategies which will increase corporate environmental consciousness. Staff commitment to increased environmental engagement can be carefully assessed; training requirements can then be appropriately tailored on the basis of resource requirements and quantified responses of company groupings. Without periodic management reviews EMS performance could neither be suitably quantified nor qualified. Benchmarks adopted through reference to environmental performance would not be possible and good management practices impaired.

5.1.5 Environmental Statement

One of the aims of the Eco-Management and Audit Scheme is the release of reliable environmental information for public scrutiny in the form of an Environmental Statement[85]. The Environmental Statement is an important expression of both system credibility and corporate environmental performance. A weakness and strength of Environmental Statement requirements defined in EMAS regulations is its lack of prescription[86]. So although EMAS regulation may transcend the exercise of environmental legislation on a national level, companies are at liberty to interpret the tenor of Environmental Statement requirements on the basis of personal preferences. The Environmental Statement should be designed for public viewing and written in a concise and comprehensible form. Data and

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85 EEC Regulation No 1836/93, Articles 4(5.d), 4(6) and 5; EC Regulation No 76/2001, Annex III.

86 Company responses to the demands of the Environmental Statement will be influenced by the nature of national legislative requirements. Refer to Section 4.3.1 on Public Access to Environmental Information.

information in the Environmental Statement should also be reliable and adequately cover all relevant and significant environmental issues at the site[87]. This would include indirect environmental effects such as use of transport and contact with toxic or water-damaging materials. Indication should be made as to how the significance of the various environmental impacts was calculated. Other significant environmental issues would include factors specific to an industrial sector or trade conventions beyond direct legislation, and to what extent BAT principles were employed to arrive at company evaluations of significant environmental issues[88]. The Environmental Statement will contain a quantitative summary of: emission levels (land, noise, air); use of raw materials, water, energy; levels of waste, effluent; the toxicity levels and concentrations of waste and effluent; other environmental effects (eg, the release of VOCs, dust, heat, odours, radiation); details on production remnants, waste materials, residue; energy use (eg, calculated CO^2 levels); contaminated land and action taken. Other factors will include: environmental history of site, experiences of accident and risk management on site and descriptions of environmentally-related accidents. All significant changes in corporate environmental practice subsequent to the last Environmental Statement should be documented. Environmental Verifiers may choose to waive the future requirement of an annual Environmental Statement for SMEs in particular where operational activities have remained constant or where there is a record of insignificant environmental change at a site[89].

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87 EMAS has been designed exclusively to validate sites, whilst ISO 14001 validates organisations. The definition of 'organisation' under ISO 14001 is fairly fluid. An 'organisation' can be a literal organisation, including many industrial plants, and equally an 'organisation' can be a single unit within what EMAS regulation defines as a 'site'. The definition of a site is uniform, referring to "... all land on which the industrial activities under the control of a company at a given location are carried out, including any connected or associated storage of raw materials, by-products, intermediate products, end products and waste material, and any equipment and infrastructure involved in the activities, whether or not fixed" (EEC Regulation No 1836/93, Article 2(k)). Therefore, parameters of full audit validation are functionally diverse under ISO 14001 but functionally fixed under EMAS regulation.

88 Refer to Chapter 4.3.3 on Integrated Pollution Prevention and Control.

89 EEC Regulation No, Article 5(6); EC Regulation No 76/2001, Article 11. Refer to EEC Regulation No 1836/93, Article 5(3) or EC Regulation No 76/2001, Annex V for examples of corporate changes requiring documentation.

5.2 German Legislative Interpretation of EMAS

The EMAS Regulation scheme prescribes the establishment of an accreditation system of independent environmental verifiers in each Member State[90] and the German Environmental Audit Law (*Umweltauditgesetz* (*UAG*)), was passed on 7 December 1995 in response to this ruling. Within the *Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit* (*BUNR*, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) an Environmental Verifier Committee was formed with the task of setting up competent bodies in keeping with EMAS and the *UAG*[91]. The *UAG* shares the integrative characteristics of EMAS which facilitates social and technological change in industry. It also contributes to the maintenance of institutional and social relations with the German State by subsuming EMAS in the body of German environmental legislation.

As indicated in *UAG* §30 in Appendix C.2 the exercise of the *UmweltHG* has notable environmental management implications for German firms which are currently not faced by UK companies[92]. Comparing the Eco-Management and Audit Scheme with the *UAG* in Appendix C.2 identifies these as primarily relating to quality assurance (*UAG* §§ 5 and 8), knowledge *UAG* §§ 12 and 13) and communication (*UAG* §§ 20-29). The composition and functionality of the Environmental Verifier Committee is drawn from existing industrial relations models

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90 "Member States shall each establish a system for the accreditation of independent environmental verifiers and for the supervision of their activities. To this end, Member States may either use existing accreditation institutions or the competent bodies referred to in Article 18, or designate or set any other body with an appropriate status." (EEC Regulation No 1836/93, Article 6.1; EC Regulation No 761/2001, Article 4.1) "Member States shall ensure that the composition of the competent bodies is such as to guarantee their independence and neutrality.... The competent bodies shall, in particular, have procedures for considering observations from interested parties concerning registered sites, or deletion or suspension of sites from registration." (Article 18.2; EC Regulation No 761/2001, Articles 5.2 and 5.3)

91 The task of registering audited sites was conferred to the *Industrie und Handelskammer* and *Handwerkskammer* (Chambers of Commerce and Crafts of Commerce). The accreditation organisation formed was the *Deutsche Akkreditierungs- und Zulassungsgesellschaft für Umweltgutachter mbH* (German Accreditation and Registration Organisation for Environmental Verifiers Ltd). This organisation is (financially) supported by the *Deutscher Industrie und Handelstag* (*DIHT*) (German Federation of Chambers of Industry and Commerce), the *Zentralverband des Deutschen Handwerks* (*ZDH*) (Association of German Craft Industry), the *Bundesverband Freier Berufe* (*BfB*) (Federal Association of the Self-employed) and *Bundesverband der Deutschen Industrie* (*BDI*) (the Confederation of German Industry) and nine trade associations. Environmental verifiers and Environmental verifier organisations can only be registered through *DAU* unless their registration was permitted in another Member State and prior notification was received by the German accreditation system and registered in industrial sectors on the basis of their specialisms.

92 Refer to Section 4.3.4 on Environmental Liability Law.

such as the *Betriebsrat*, also discussed in Chapter Six, guaranteeing that industrial network flows are governed by uniform understandings of best practice[93]. The communal character of this Committee apparatus supports the capture of focussed knowledge that underpins the transformation processes that a (German) firm will ideally pursue through EMS implementation. The industrially-integrated nature of the Committee representation also determines that all aspects of business strategy and specific technological dimensions are accounted for in an analysis of environmental management and training. Equally, the measures outlined at *UAG* §§ 5, 8, 12 and 13 suppress the fracturing or dilution of institutionally developed environmental understandings applied to diverse corporate circumstances.

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93 The Environmental Verifier Committee comprises of the following representatives: 6 representatives from companies or enterprise representing organisations, 4 from Environmental Verifier Companies or Environmental Verifier representing organisations, 2 from Federal Environmental Administration, one representative from the Federal Economic Administration, 4 from the *Länder* Environmental Administration, 2 from the Economic Administration of the *Länder*, 3 representatives from Trade Unions, and 3 from Environmental Associations.

6 SOCIO-ECONOMIC INFLUENCES ON ENVIRONMENTAL CONSCIOUSNESS

In previous Chapters the variable impact of environmental values and attitudes in relation to environmentally conscious behaviour has been examined. This Chapter extends the discussions of previous Chapters on environmental consciousness through a consideration of wider contextual developments which may directly or indirectly influence environmental values and response within social systems. Environmental consciousness is described as a socially bounded construct. Accordingly, symbolic and organisational structures of society such as environmental business support organisations espouse 'environmentally relevant orientations' rooted in environmental consciousness[94]. The aim of national environmental policies delivered in part through such business support organisations is to maintain the quality of living conditions and protect the interests of the general public where conflicts surface between economic and ecological interests. Implicit in the notion of conflict is an absence of conceptual or material congruence, or a lack of system coherence, which perpetuates existing disharmony. Explicit in the resolution of conflict at the intersection of the economic and the ecological are values expressed through the ideological frameworks and industrial policies of nation states. An examination of the conceptual basis of industrial policy rationales in the UK and Germany serves to identify the industrial principles and values of the respective national systems which define cultural discourse in relation to economic objectives, SME engagement and environmental modernisation. It is argued that the nature of specific industrial policy areas relating to employment relations, industrial finance, vocational training and education, configure the social *milieu* in which institutional environmental endeavours are undertaken. These configurations often indirectly but significantly influence the ecological sensibilities of SMEs and their ability to embrace environmental practices. The Chapter will also illustrate a distinct interrelatedness between

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94 Urban (1986), p. 374.

industrial strategies seemingly divorced from environmental policy formulation and its impacts.

6.1 Industrial Policy

The German expression *Industriepolitik* is often and erroneously considered to be an appropriate translation of the English term 'Industrial Policy'. In German socio-economic contexts the terms 'industrial' and 'producing industry'[95] are interchangeably used with reference to manufacturing companies, especially where there are more than 20 employees. *Industriepolitik*, however unintentionally, can engender a sense of disenfranchisement amongst employers and employees in the smallest enterprises, which conflicts with both the rhetoric and practice of German national economic strategy (Stille 1990). In practice, what is described as 'industrial policy' in the UK is operationally equivalent to *Strukturpolitik* or 'Structural Policy' in Germany[96].

6.1.1 Industrial Strategy in Germany

Modern German economic policy was fashioned out of the experiences of recession in 1967 and the desire to better contain the consequences of economic downturn. What came to be described as *Strukturpolitik* within a social market

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95 The 'Producing industry' ('*produzierendes Gewerbe*') is not to be confused with 'processing industry' ('*verarbeitendes Gewerbe*'). The 'processing industry' ('*verarbeitendes Gewerbe*') refers to enterprises engaged in the manufacturing of products through the act of manual or automated processes. This will include craft enterprise occupations and larger scale enterprises involved in activities such as metal processing, material finishing, clothing and textiles, glass production, etc, but excludes the following classifications: mining, earth; energy and water extraction industries; building and construction; transport trade (motor maintenance/repair, petrol stations); wholesale trade and commission trade; retail trade; hotels and restaurants; post and telecommunications; banking and insurance and personal services. 'Producing industry' ('*produzierendes Gewerbe*') refers to all enterprises in the processing industry (*verarbeitendes Gewerbe*) and in the mining (*Bergbau*) industry, plus processing industry enterprises, which belong to companies engaged in activities outside of the definition of 'producing industry', which have more than 20 employees. For a more detailed explanation, refer to BMWi (1998), p. 19, 109, 154, 300.

96 The German term *Politik* is a general expression lacking the precision furnished in the English language in this instance through its use of Polity, Politics and Policy, which are all implied by *Politik*. The implications of this differentiation are not immediately apparent but can on occasion be at the root of contextual misunderstandings. 'Policy' characterises the material and contextual aspect of *Politik* in the sense of the activated plan, which maps out the problems, tasks and goals. This dimension finds expression in laws, programmes, decrees, and individual/collective behaviour or fulfill a symbolic function. 'Polity' alludes to the institutional aspects of politics which are defined by the constitution, legislation and tradition. Government, governmental administration, Parliament, the political parties, and associations are subsumed under this definition. In this chapter where the impact of the industrial processes and law on SMEs is reviewed, the principal concern is with the dimensions of polity and policy. However, an assessment of industrial policy will not escape the overtones of politics.

economy was defined by the *SPD* Federal Economics Minister Schiller alongside the Council of Economic Advisers (*Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung*) during 1967-1969. In general terms, the Schiller concept holds that governmental support of declining industries through adjustment aid is justifiable, and structural change should be supplemented by corresponding social policy measures. Equally, government should support innovative industries which without aid would not expand at a desirable rate. Those notions found legal expression in the 1967 *Stabilitäts- und Wachstumsgesetz*, (*StWG*) (Stability and Growth Act), and were subsequently established in the *Grundgesetz* in 1969 via §§104a, 106, 107 and 109.

The aligned economic objectives of the *Bundesländer* and federal governments as expressed in §104a are reinforced by the budgetary practices between federal and regional governments in §109. Regional sovereignty is therefore maintained but not at the cost of a high coincidence of uniformity required to frame budgetary policy. The principles of §106 and §107 provide the framework of German fiscal policy, which aims at promoting similar living standards throughout all regions via regional tax redistribution on the basis of calculated identified need. Within the German federal framework it is difficult to divorce the twinned objectives of structured regional policy from fiscal policy. The principles of *Strukturpolitik* as expressed through State intervention tend not to interrupt the outworking of competitive forces in German industrial sectors or regions unless:

- the secure provision of engaged actors is compromised;
- regional or sectoral implications are socially unacceptable;
- high risk ventures are likely to only generate marginal success through the single efforts of private firms.

These principles allow for complete flexibility and can be applied to competitive policies targeting specific industrial issues. The interests of enterprises located in or attracted to depressed areas are served and the requirements of enterprises in

economically buoyant areas can be more specifically targeted through economic measures aimed at neutralising regional disparities and economic deficiencies[97]. One of the effects of *Strukturpolitik* was to stimulate both concentration and dispersal patterns amongst all company enterprises.

6.1.1.1 Significance of the *Mittelstand*

The notion of the *Mittelstand* has deep-rooted traditions in German economic thought and the meaning of the term as used in the nineteenth century[98] surprisingly still shares much in common with its current usage. Seyffert's "Wirtschaftslehre des Handels" in 1951 is to be valued for its formulation of size categories within the *Mittelstand*. He introduced the idea of scales of state within smaller companies, described as '*klein*' ('small') and '*mittlere*' ('medium'). 'Small' and 'medium' categories were not statistical measurements of frequency but combinations of qualitative characteristics assessed alongside quantitative factors[99]. Not all of Seyffert's commentary was his own, for example, his reflections on the central role played by the manager-owner were drawn in part

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97 For a review on inward investment received by the new *Länder* in Eastern Germany refer to Siebert (1991) and Krupp (1991).

98 Hegel in 'Rechtsphilosophie' (1821) spoke of the *Mittelstand* as the depository where the acculturated intelligence and legal consciousness of the people was to be found, ".... [*in den Mittelstand,*] *die gebildete Intelligenz und das rechtliche Bewußtsein des Volkes fällt" und der nur entstehen kann „durch die Berechtigung besonderer Kreise, die relativ unabhängig sind, und durch eine Beamtenwelt, deren Willkür sich an solchen Berechtigten bricht...* " (G.W.F Hegel, Rechtsphilosophie (1821), quoted from Gantzel, p. 27). Goethe's definition of the *Mittelstand* indicated the social inclusiveness of the term: "... [*Zum Mittelstand*] *gehören die Bewohner kleiner Städte, deren Deutschland so viele wohlgelegene, wohlbestellte zählt, alle Beamte und Unterbeamte daselbst, Handelseute, Fabrikanten, vorzüglich Frauen und Töchter solcher Familien, auch Landgeistliche, insofern sie Erzieher sind. Die Personen sämmtlich, die sich zwar in beschränkten, aber doch wohlhäbigen, auch ein sittliches Betragen fordernden Verhältnissen befinden, alle können ihr Lebens- und Lehrbedürfnis innerhalb der Muttersprache befriedigen..*" J.W. von Goethe (1816): Deutsche Sprache, in: Aufsätze zur Literatur, ibid.

99 An important idea was that a *Mittelstand* company would be the full-time occupation of a thoroughly trained, experienced and able specialist. Central to the idea of distinguishing the 'medium-sized' firm from the 'small' and 'large' firm was the centrality of the role played by the owner manager and the nature of company assets or administration. A *Mittelstand* company was described as either a small company in which the owner personally performed management tasks, or a medium-sized company in which the owner was the prime orchestrator of wider, in part, delegated management tasks. Seyffert also considered the *Mittelstand* company to be characterised by the personal relationship between the owner and members of staff as a consequence of the control exercised by its leader. Generally a correlation existed between the intensity of company relationships and company size. The 'familial' nature of the business was felt to be one of the important features of the *Mittelstand* since this factor contributed to a flexibility and agility absent in larger companies, often described as bureaucratic or lacking the hands-on initiative of its employees. In a medium-sized *Mittelstand* some of that flexibility would become centralised in sub-operational units, but more important than company growth as a criterion indicating transition from a medium to a large capital company was the ability of the owner to oversee overall command.

from authors such as Heinrich Nicklisch[100], but he crystallised often disparate ideas in a novel and enlightening way during the 1950s. In his consideration of company size Seyffert also introduced the notion of the *Minderbetrieb*, a 'micro-firm', which he described as smaller than a 'small firm' by virtue of the seasonal nature of its production or other supply and demand factors[101]. Along with many other commentators Seyffert appreciated that a *Mittelstand* company could have more or less employees as determined by sectoral or individual circumstances, in the same way that large companies could occupy any location along the employment size continuum.

Strukturpolitik has positively influenced the performance and industrial capacity of the German economy through the introduction of SME legislation designed to support the performance of a diverse range of competent small and medium-sized business owners. '*Mittelstand*' enterprises are those *KMU* or German SMEs subject to the *Mittelstandsförderungsgesetz* (*MFG*) (*Mittelstand* Support Law). The *MFG* exercises the subsidiarity and proportionality principles. Therefore, *Bundesländer* are committed to adopt measures which address regional issues in keeping with the specific objectives of *Strukturpolitik*. All federal and other establishments within the *Bundesländer*, including law making authorities are obliged to accommodate the programmes, plans and measures set in motion through the objectives of *Mittelstand* regulations. Support for the *Mittelstand* ensues from the economic and political principles of regional policy which complement the *MFG*. The aim of support is to stimulate the initiative of smaller firms and to enhance the self-motivation of firms without infringing upon the self-determination or autonomy of recipients of financial support. Such support is generally contingent upon personal efforts of a firm and on the understanding that intended objectives will be attained. All support measures provided by the *MFG*

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[100] In 1926 Heinrich Nicklisch wrote the publication entitled "Handwörterbuch der Betriebswirtschaft" in which the role of the owner manager in a *Betrieb* (firm) and an *Unternehmung* (enterprise) was devoted detailed consideration. The *Betrieb* and *Unternehmung* were examined as spaces within which foment distinct psychological patterns.

[101] Seyffert (1951) pp. 341-343.

and other public support schemes have been designed to maintain or enhance the objectives of existing measures. These measures must also be set in relation to the medium-term finance budgets of the *Bundesländer*. The guiding principles of the *MFG* have ensured that:

(i) national smaller firm capability and competitive capacity is acquired and increased in all industrial sectors, including tourism;

(ii) employment and training opportunities in the *Mittelstand* are secured and extended;

(iii) new firm formation and growth programmes as well as mature firm maintenance services are provided to alleviate some of the difficulties experienced by the *Mittelstand* in industry;

(iv) the *Mittelstand* is familiar with and supported by economic and technological change in industry;

(v) the *Mittelstand* can improve the conditions in which and abilities through which it exploits personal capital;

(vi) the possibilities of cooperation between small and medium-sized enterprises in industry are extended.

The *MFG* also requires that the *Bundesländer* support relevant research or technical development and its implementation in business practice. Therefore, information deficits of the *Mittelstand* in corporate environmental fields such as the implications of the *UmweltHG* or introducing an EMS, are systematically addressed by regional support systems. The *MFG* also determines that regional institutions promote innovative practices and cooperation amongst the *Mittelstand*, through, for example, the Frauenhofer institutes[102]. A condition attached to support provided for innovative practice is that research results are made available to the public. Grants can also be provided for *Mittelstand* companies to attend trade fairs and exhibitions which support market reconnaissance and new market acquisition.

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[102] Over 30 regionally based *Frauenhofer Institutes* perform applied contract research with income from public and private sponsors, being matched 1:1 by the *Bund* and *Länder*. They are non-profit making institutions engaging in joint collaborative projects with other firms and small firms may receive subsidies from the government against the work they commission.

These structural provisions have directly contributed to celebrated successes of the *Mittelstand* (Simon 1996) and it is questionable, in the face of growing global competitive forces since the 1970s, whether the economic prowess and stability of the *Mittelstand* could have been secured without enabling legislation. What distinguishes the *Mittelstand* from SMEs is their scope of reference. *KMU* or SME identify predominantly quantitative and qualitative characteristics peculiar to an enterprise, its workforce and management. '*Mittelstand*' refers to those characteristics but also defines the range of institutional and intra-regional support received by smaller companies to guarantee their competitive and economic wellbeing as outlined in the *Mittelstandsförderungsgesetz*. Therefore, it is misleading to describe UK SMEs as the 'UK *Mittelstand*' or to identify the *Mittelstand* concept with UK industrial policy as has been done by some authors (James, Prehn and Steger 1997, Poutziouris, Chittenden and Michaelas 1999). Also it is not possible to appreciate the significance of the *Mittelstand* without understanding its centrality to the German market economy and Federal regions.

6.1.2 Industrial Strategy in the UK

The aim of this Section is firstly to examine important influences on the evolution of regional policy in the UK in relation to SME policy. Secondly, recently introduced UK regional and SME policy frameworks are considered as the basis of a new understanding of SME engagements within UK industrial policy.

Regional policy as practised by West Germany and variations of that paradigm were not alien to UK political thought. Much attention was given to UK devolution during the 1974-79 Labour term. In office, devolution in the UK was an early consideration and certainly regionalisation of a form was anticipated through the strengthening of Local Authority economic and political influence (Hogwood and Keating 1982). Although the 1960s and early 1970s were characterised by a decline in UK manufacturing, the strong SME growth through a burgeoning service sector and relative success of the UK economy contrived against introducing an

unproven model of governance. Liberalist traditions associated with British politics and economics discorded with the traditions of West Germany, whose post-war statutory framework was consciously designed to constrain influence. Three factors can be listed as ultimately working against regionalisation of the UK linking SME development and productivity to defined regions during the Wilson-Callaghan tenure. Firstly, there was staunch cross-party resistance to the concept of devolution *per se*, and secondly, objections were raised about the form devolution was expected to assume. Thirdly, the oil crisis and recessionary conditions of that period redirected the focus of government, offsetting many of the longer-term national plans envisaged by the Labour regime (Neuberger 1990).

The incoming Conservative government under Mrs Thatcher rejected the merits of regionalisation arguing that equitable regional employment should not be promoted above efficiency gains of the economy (Brown, Deakin and Ryan 1997). It was felt that employment created in Assisted Areas simply displaced employment in the areas not provided assistance whilst locating firms in inefficient areas disadvantaged enterprise competitiveness. Subsequently UK SMEs did not enjoy the financial support of their German counterparts in terms of regional reallocation nor did successful SMEs located in relatively poor economic regions benefit from incentives to remain in those regions or specific support as a consequence of depreciating economic regional conditions. Conservative Government attitudes about regionalism underwent notable change under John Major. The social and economic benefits of employment generation in Assisted Areas were acknowledged, as was the importance of supporting national competitive plans with regional industrial policies (DTI 1995)[103]. The availability of European Union Structural Funds also contributed to the need to define UK regions since the receipt of grants was in part dependent upon regional definitions. The emphasis that EU Structural Funds place on regional programmes has encouraged the development

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[103]"... the Government recognises the importance of enhancing the competitiveness of the Assisted Areas. There has been a refocusing of regional industrial policy to reflect its role in achieving both economic and social objectives..." DTI - The White Paper on Regional Industrial Policy, p. 6.

of regional networks between local authorities and local business organisations such as TECs and Business Links. Ten English Regions were formed in 1993 to channel central government financial support and resources into areas in a more structured way than hitherto practised.

It is perhaps too early to assess regionalisation under the New Labour Government, but notable institutional developments have been made in the form of devolution of power to Scottish Parliament and Welsh Assemblies. New Labour plans for regional governance in England were outlined in the consultative document *A Choice for England* (Labour Party 1995). It was anticipated that regional chambers would ultimately perform co-ordination and democratic functions within Integrated Regional Offices, and bring together business, trade unions, professional and training organisations to improve the organisational structure and SME representation in each region[104]. Government Offices in the UK regions would continue to conduct its normal responsibilities, but within integrated RDA strategies[105]. The Competitiveness White Paper (DTI 1998a) highlighted some of the economic and strategic handicaps experienced by smaller companies[106] and RDAs have aimed at more effectively targeting these issues through local business networks.

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[104]An optional second phase of the devolution process would involve establishing directly elected regional assemblies in those regions in which public demand was evident. In harmony with the aims of this pre-election document, eight Regional Development Agencies (RDAs) were set up through the Regional Development Agencies Act (1998) and a ninth RDA in the form of an elected strategic authority for London with city-wide and regional functions planned for in the year 2000. The regions and their constituents are defined in the RDA Act 1998, Schedule 1.

[105]RDA regional strategies fall within the remit of national competitive planning objectives. The Secretary of State can provide RDAs with guidance and direction in relation to the contents, issues addressed, the strategies adopted and the updating of RDA strategies. The financial duties of RDAs is determined by the Secretary of State (RDA Act 1998, s. 7(1), (2), (3); s.9). RDAs are business-led but it is expected that of the thirteen board members in each Regional Agency four of these will have local government experience reflecting the geographical and political spread of the area. The designation of Regional Chambers within RDAs serves to ensure that local views remain central in the deliberations of RDAs, which are ultimately accountable to Ministers and Parliament. Regional Chambers are voluntary compositions of councillors from local authorities and business sector representatives from the regions who will consider how the mechanisms required to ensure that regional issues are co-ordinated into RDA strategies and how the socio-economic requirements of the regions are satisfied by such strategies. RDAs will be expected to consult with their Regional Chambers on its corporate plan and all other developments affecting the regions (DETR 1997). Future Regional Chambers may be more directly involved in the determination of Regional Planning Guidance (RPG) activities currently performed by other bodies such as regional transport and sustainable development strategies (DETR 1997 and 1998).

[106]The Competitiveness White Paper (1998) also stressed the strategic importance of Information and Communication Technologies for the future competitiveness of the UK economy and sets out a national strategy which aims at tripling the number of UK SMEs in the digital economy.

Collaboration with Government Offices and Innovation Units will further enhance the relevance of programmes provided through Environmental Networks and Business Clubs such as the Environmental Technology Best Practice Programme, the Environment Council, Environmental Supply Chain Forum and the SMART award, designed to encourage business enterprise to apply and develop innovative products and processes[107]. RDAs will also be able to more readily identify opportunities for enhancing business strengths or exploring new market options through improved links between local industries, business support organisations and academic institutes now under their strategic oversight (Quah 1999).

6.1.2.1 SMEs and New Labour

The Small Business Service (SBS), which was launched by the New Labour Party in April 2000, has been widely welcomed across industry, including public and private business support organisations. The SBS aims at addressing the specific concerns and needs of all firms with less than 250 employees. The proposed functionality and structure of the SBS is outlined in an initial consultation document (DTI 1999c) and in a Government response document (DTI 1999d). The idea of a Small Business Service is borne out of the experienced inadequacies of the UK free market paradigm to adequately meet the socio-economic needs of SMEs discussed in previous sections. It is here argued that these inadequacies can and

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[107] The Environmental Technology Best Practice Programme is a joint DTI and DETR programme. It offers free advice and information for UK businesses on technical matters, environmental legislation, conferences and promotional seminars. The programme promotes environmental practices that increase profits for UK industry and commerce and reduce waste and pollution at source. Smaller companies may also be entitled to a free counselling service. The Environment Council is an independent charity dedicated to protecting and enhancing the UK's environment by promoting effective dialogue and a collaborative approach to problem solving. It's 'Business and Environment' Programme focuses on environmental management challenges, in particular business response in further environmental policy and management systems. Its 'Consumers at Work' Programme aims at motivating individuals to understand their environmental impact and make a positive environment contribution to organisational targets and objectives. Its 'Sustainable Business Forum' explores the strategic challenges facing business from environmentally-driven factors in particular, developing how business can move beyond legislative compliance to deliver environmentally sustainable business. The Environmental Supply Chain Forum was set up to allow organisations to share experiences and determine 'best practice' in the integration of environmental criteria into purchasing. It provides a platform for learning and the discussion of supply chain issues, as well as the opportunity for individuals involved in environmental purchasing to network. The SMART scheme supports SMEs and individuals in the research, design and development of technologically innovative products and processes for the national benefit. The scheme provides funding of 75% of project costs, a maximum of £45,000 to support technical and commercial feasibility studies and 30% to assist the development of technological products. Companies can apply for a SMART grant during any project phase, where the maximum grant available in for one applicant is to date £200,000.

have significantly destabilised environmental improvement capacities of firms in general and specific ways. Examples of the areas of impact include an integrated understanding of company enterprise, the availability of accurate and appropriate information flows between management and staff, and appropriately resourced staff. Consideration of such fundamental attributes must precede the specificities of environmental policy frameworks for SMEs.

A possible weakness of the Government's SBS proposal is its current failure to emphasise the importance of strong links with Chambers of Commerce through which partnerships could be created. The Government has so far not pursued the option of compulsory Chambers of Commerce membership operating in Germany and Continental Europe.

6.1.3 National Policies and Environmental Modernisation

At the time of the second oil crisis in 1979, the environmental policies in the UK and Germany shared similar environmental policy objectives, namely, economic growth focus through traditional instruments (Weale 1992). The principal legislation for controlling air pollution in these countries targeted air pollution in much the same way[108]. By the early 1980s the philosophical commitments of British and German environmental policy had distinct material forms, typified by Germany's adoption of the Large Combustion Plant Regulation (*Großfeuerungsanlagenverordnung, 1983, (GFAVo)*) in response to the destructive impact of acidic atmospheric deposition on its forest ecosystems (*Waldsterben*)[109] and the UK's unwillingness to accept the conditions attached to the Large Combustion Plant Regulation. This regulation

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[108]The Control of Pollution Act 1974 (COPA) and the *Bundesimissionsschutzgesetz 1974* (Federal Air Quality Control Act); in both cases 'economic feasibility' was a key aspect of pollution control, in contrast to the Atom Law, 1955 (*Atomgesetz*), which was governed by the most recent scientific knowledge and its application without regard to cost.

[109]Acidic atmospheric deposition (acid rain) predominantly occurs where oxidised sulphur compounds (SO_x), oxidised nitrogen compounds (NO_x) and reduced nitrogen compounds (NH_x) are released into the atmosphere, normally through heat processes (ie, coal-fired power plants, oil-fired power plants, oil refineries, motor engines). In the case of reduced nitrogen compounds such as ammonia, which is not an acidifying substance (but whose alkaline properties lead to cultural eutrophication), ecological danger surfaces when it is converted into nitric acid by soil-based nitric bacteria or is absorbed by vegetation which produces hydroxy acids. The consequence for waters in areas where the natural soil carries less alkaline components can be quite serious. For a detailed review of impacts of accelerated acidification refer to Straaten (1996) and Emmett (1999).

introduced stringent emission limits on sulphur dioxide and oxidised nitrogen compounds in large furnaces on the basis of the *Stand der Technik*. It also specified that existing plants would have to implement those higher standards by 1988[110]. Legislation covering small combustion plant regulation had previously been issued[111] but the *GFAVo* required *de facto* use of flue-gas desulphurisation equipment and catalytic reduction of nitrogen oxides as state-of-the-art technology to contain environmental pollution in keeping with the principles of *Vorsorge*. It would be misguided to imply that the *GFAVo* encountered no resistance from German industry[112] but its implementation was successful. By 1990 the West German electricity supply industry had 'over-achieved' its 1993 target of a 75% reduction in SO_2 emissions and NO_x emissions were reduced 50% of their 1982 levels[113]. To guarantee the acceptability of the clean-air measures throughout industry, covering plant stations as well as industrial plant machinery, the German Government also provided tax relief and other economic incentives such as low-interest loans under the Economic Recovery Programme (ERP) and various forms of support through regional *Mittelstandsförderungsgesetz* to ensure that smaller enterprises were able to significantly contribute pollution abatement and technological innovation[114]. The British response to the German Large Combustion Plant Regulation after electricity privatisation was to allow those generators to meet emission targets through the burning of low sulphur coal without providing financial inducements to install flue-gas desulphurisation equipment. UK Government rejection of proposals to comprehensively reduce SO_2 and NO_x levels was explained in terms of the failure of the European Commission to provide a 'more objective and scientifically sound basis for the proposed controls'[115]. The early 1980s marked the birth of the phase in UK environmental policy-making

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[110] The Large Combustion Plant Regulation of 1983 applied to all combustion plants rated above 50 MW thermal and introduced or tightened the requirements of existing emission limits for groups of pollutants including, halogen compounds, carbon monoxide, heavy metals and tightened the requirements of other industrial gases.

[111] *Kleinfeuerungsanlagenverordnung, 1974*

[112] Refer to Boehmer-Christiansen and Skea (1991), pp. 196-201 for a discussion on economic and political developments marking the implementation of the *GFAVo*.

[113] ibid., p. 201.

[114] ibid., p. 202.

[115] Ibid., p. 211.

history renowned for its comparative failings. The 'dirty man of Europe' title bestowed upon the UK was the consequence of an apparent lack of interest in the adoption of environmental measures preferred by the majority of European Community Member States aimed at proactive prevention of pollution. Environmental success secured by the UK measured in terms of reductions in total emissions of sulphur dioxide by 2.3% in the early 1980s owed more to the effects of the downturn in the economy after the deflationary budget of Sir Geoffrey Howe than it did to UK environmental endeavour. The UK also rejected encouragement to adopt the emission limits outlined in the EC Large Combustion Plant Directive, modelled on the German *GFAVo*, in 1983 and it was only after exhaustive negotiations by 1988 that the UK accepted the fairly liberal emission targets set by Directive 88/609/EEC. The UK lagged behind its European partners in their attempts to reduce pollution entering Europe's rivers and coastal waters through its lack of candidness when identifying pollution in bathing waters as outlined in 76/160/EEC[116]. The UK Government also stalled the process leading to the Montreal Protocol and Vienna Convention Agreements resulting in the international restriction and ban on CFCs. It is difficult to understand the polarisation of environmental attitudes and engagement of Government, characterised by the UK's consistent aversion to substantive environmental change on one hand and the environmental radicalism of Germany on the other, without reflecting upon the broader political structures and ideologies which shaped both the executive institutions and prevailing attitudes of that period. A usual point of reference is the UK's majority voting electoral system in contrast with the Germany's system of proportional representation. The system of proportional representation as exercised in Germany has denied singular political parties exclusive legislative control, whilst in the UK the party receiving the majority vote gains the legislative control. Hence German Governments have been formed by coalition parties, whose political expression is shaped by concession, compromise and greater

[116]Less waters were identified than in land-locked European countries. Refer to Haigh (1989), pp. 161-169.

consideration of the concerns of alternative parties such as the *Grünen.* In the UK the political party in office has been at liberty to pursue its objectives without an obligation to overtly modify political ideals or accommodate 'green' political perspectives which may have general appeal. Consequently the influence of the Green vote remained dislocated at a national level, although at the 1989 European Parliament elections the British Green Party recorded 15% of the UK vote, the highest of all European Member States[117]. This argument suggests the evolution of environmental policy in the UK and Germany is predicated upon difference in electoral frameworks[118]. Whilst the general points of reference cannot be discounted, the focus on the voting system *per se* oversimplifies the processes of industrial governance and the exercise of power within it. Modern environmentalism in Germany came into existence through '*staatliche Autogamie*' and public political support, not through the interventions of an official environmental Party operating within the existing political constitution[119].

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[117]Weale (1992), p. 73.

[118]This thesis is supported by the experiences of the original Green Party in the UK, the 'People' in 1973, which was also the first modern environmental party in Europe. The profiles of the UK and German political parties were defined in the Representation of the People Act 1969 (modified by the Representation of the People Act 1983 and latterly Registration of Political Parties Act 1998) and the *Parteiengesetz.* 'Political parties' are subjected to a greater level of circumspection in German law before they are registered as official political parties than is experienced in UK law. Nominated candidates can be submitted by *Bundesland* or grouped on single list for all *Bundesländer.* Political parties and political associations organised on a membership basis can also submit lists of candidates. However, if candidates are not represented in the *Bundestag* or *Landtag* by at least five members they require 4,000 signatures in order to be placed on a Federal list or 2,000 signatures for a Land list (§15 *Bundeswahlgesetz*). In the UK candidates need not be nominated by a political party and nominations in constituencies need be endorsed only by 30 electors in addition to paying a deposit of £1000. As a consequence, German social movements which become official political parties will have displayed and possess a particular organisational stability, professionalism and geographical reference which will not necessarily characterise newly-formed political parties in the UK (§6 *Parteiengesetz*). Financial funding received by German political parties (§18 *Parteiengesetz*) within a proportional system heightens the relevance of voiced issues in the political arena. The formation of the 'People' Party in 1973 was neither legally subject to tests of organisational professionalism nor was it in receipt of commensurate State funding (nor would it be today, despite modifications to political party financing procedures have been established since the Neill Committee Report). Its inability to secure significant votes at a local and national level would suggest its formation was not necessarily a main national concern. The absence of any form of proportionality in the UK voting system also denied the 'People' party the opportunity to record the qualitative significance of public green concern.

[119]Germany's modern Environmental Policy was established with no resistance by the Social Democrat-Liberal coalition in response to significant and visible environmental degradation in industrial regions and public concern with nuclear energy. Examples of concern were provided by protests against the storage of nuclear waste in Gorleben (100,000 anti-nuclear power protesters in March 1979 in Hannover), the West Runway in Frankfurt (demonstration with more than 100,000 protesters in October 1981), the reactor in Kalkar (20,000 demonstrators, October 1982), the nuclear reprocessing plants in Wackersdorf (October 1985, 50,000 participants), Schwandorf (40,000 person, February 1985) and the nuclear plant in Brokdort (100,000 individuals, Februar 1981) and Whyl (40,000 demonstrators, April 1982). For a detailed review environmental social movements in Germany and the evolution of German environmental protection refer to Rucht (1980), Wey (1982) and Raschke (2001).

Environmental policy cannot be divorced from national industrial policy, of which it forms a part. As previously discussed, the constitutional framework of Germany, and consequently its industrial framework, is significantly shaped by *Strukturpolitik,* as is the UK industrial policy influenced by the absence of a corresponding meta-ideological framework. In general terms *Strukturpolitik* aims at promoting opportunities to secure national economic wealth as well as neutralising quantitative and qualitative socio-economic disadvantages, which arise primarily from industrial activities practised within German national boundaries. *Strukturpolitik* legislatively guides the thematic content and direction of national policy by determining what socio-economic interests cannot be excluded in the exercise of party politics. This process equally legitimises and justifies commitment to socio-economic engagements in keeping with the principles of *Strukturpolitik.* Certainly until 1997, change of UK political government has been accompanied by the ideological re-engineering of national industrial policy. It is argued that this preoccupation with constructing political distinctions and identity has masked both immediate and longer-term deficiencies of UK industrial policy (Cowling and Tomann 1990).

The greatest influence on the rejection of EC Environmental Directives by the Conservative Government can be traced to the conflicting ideological aspirations of the European Union's Environmental Policy and Conservatism. Robinson (1992, p.189) describes the national patriotism shared by Conservative supporters in particular, irrespective of their attitudes towards the environment, as an impediment to European relations. Cooperation with the European Community was often perceived as an encroachment on the national sovereignty of the UK, therefore, appeals for uniform European Union legislation were considered with suspicion. Another important factor influencing the nature of environmental debate between the UK and the European Community was the centrality of deregulation in the *laissez faire* market economy doctrine in Thatcherism. A successful competitive market economy under Thatcherism was understood to require the release of economic factors of production from Government control. Legislation promoting

economic (and, by extension, social forms) of individualism and voluntarism were subsequently introduced. Commitment to EC environmental engagement constituted a serious challenge to Thatcherism since environmental engagement prescribed by the European Union involved high levels of State Planning (Haigh and Lanigan 1995). It also demanded the introduction of higher levels of environmental and social regulation from Member States, collective responsibility and increased public spending in conflict with the enterprise *milieu* Thatcherism had introduced to UK industry (Gray 1998). The increased public concern with the degeneration of the environment prompted the introduction of environmental legislation designed to protect human health and environmental quality in both the UK and (West) Germany. The societal embrace of environmental principles such as *Vorsorge* during the 1970s and the growth of their usage in Germany can equally be considered in relation to the lack of a constitutional *motif* on the environment in a social system predisposed to legally define and enact its social responsibilities[120]. However, to imply that a constitutional definition of environmental protection was the vehicle animating environmental change in Germany would also be misleading. This environmental dimension[121] amounted to

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[120]Strong opposition from major parties on the Right prevented the introduction of an environmental protection clause to the State constitution during the 1980s and 1990s. Their reservations were prompted by the recessionary climate further exacerbated by the financial costs of reunification. The difficulty for the German Constitutional Court was the form that such an environmental provision should have and the implications of it (Fleury 1995, p. 30). The three broad options open to the Constitutional Court were introducing environmental protection into the Constitution as a 'Fundamental Individual Right from the State' (*Umweltgrundrecht*), a 'State Goal' (*Staatszielbestimmung*) and a 'State Duty' (*Staatsaufgabe*). Conferring individuals with fundamental environmental rights would enable laws to be enforced or demanded by individual citizens through administrative bodies and courts as social consensus determined. Environmental protection in the form of a 'State Goal' would serve as a legislative framework or an interpretative guide for administrative bodies and courts responsible for the formulation of environmental law based on constitutional principles. A 'State Duty' to provide environmental protection would amount to a commitment to address environmental damage and risk but is not a commitment to defined actions which could be enforced by administration bodies or courts (Fleury 1995, p. 31).

[121]After many years of consultation the Common Constitutional Commission (comprising members of the *Bundestag* and *Bundesrat*) agreed in 1994 to introduce environmental protection as a 'State Duty' defined in the *Grundgesetz*, §20a (*Schutz der natürlichen Lebensgrundlagen*), the State is to protect the responsibility for the future generations of the natural resources in the framework of constitutional order through legislation and stipulations of the law and justice through the executive authority and the dispensing of justice - "*Der Staat schützt auch in Verantwortung für die künftigen Generationen die natürlichen Lebensgrundlagen im Rahmen der verfassungsmäßigen Ordnung durch die Gesetzgebung und nach Maßgabe von Gesetz und Recht durch die vollziehende Gewalt und die Rechtsprechung*". The decision not to introduce an environmental constitutional clause in the form of a fundamental right or State Goal was based on the potential negative impacts such an imposition could have on the complex relationship between existing social and economic constitutional measures (SRU 1994, 1.2, (17)). Prescriptive approaches, it was argued, could dilute the dynamism of the *Vorsorgeprinzip*, upon which the environmental clause was based. Similarly, environmental ethics should not impede technical development since this is equally the source of processes which protect the environment (Fleury 1995, p. 30). Another argument in favour of less legislative exertion was the danger that interventions in individual freedoms (*staatliche Eingriffe in Freiheitsrechte des*

the formal 'correction' of a State constitution endowed with sufficient jurisdictional capacity to reconstruct itself and profitably address environmental deficiencies[122]. The commitment of the German State to the environmental protection of its citizens was exercised in accordance with deeply rooted principles serving the economic and social good of the State, which *Strukturpolitik* maintained. Competitive advantage was secured in the 1980s by integrating environmentally-conscious design into high quality product specifications. This was achieved through the promotion of more stringent environmental legislation, higher technical standards and expertise throughout the regions and key industrial sectors. The competitive advantages anticipated from the renewable energy and energy efficient product markets such as technological leadership and employment generation was one of the factors influencing Germany's early embrace of national ecological tax reforms (HM Treasury 1998b, Bündnis 90/Die Grünen (1998), HM Treasury 1999).

Einzelnen) could undermine the fundamental principles of the State constitution where enforced environmental measures were subsequently revealed to lack material justification. It was, therefore, felt that whilst environmental protection was guaranteed from the State, it should be conducted in relation to the other constitutional responsibilities (SRU 1994, 1.2 (18)).

[122]Other constitutional precedents were employed to legitimise environmental measures. For example, the *Grundgesetz*, §2 provides individuals with the right to life and physical integrity (*das Recht auf Leben und körperliche Unversehrtheit*), §20 provides for social welfare through the State (*Grundlagen staatlicher Ordnung*), whilst §28 guarantees constitutional rights and the representation of individual and national interests on all societal and structural levels (*Bundesgarantie für die Landesverfassungen, Gewährleistung der kommunalen Selbstverwaltung*). Refer to Kloepfer (1989).

6.2 Employment Relations

Employment relations are not singularly defined by the operations of trade unions but the latitude afforded to them provides certain insights into the nature of corporate culture. Trade unions exist to be directly involved in the formal processes defining industrial, health and employment interests in society. Admittedly corporate environmentalism was neither uniformly appreciated nor supported by trade unions during the early phases of the environmental movement (TUC 1991, DGB 1994). However, in view of the central role they have traditionally played in employment relations, corporate environmental activities would not be an unnatural extension of their existing remit.

Post 1970 industrial relations were marked by relatively high levels of conflict between trade unions and employer interests in both (West) Germany and the UK but trade union experiences in West Germany were not mirrored in the UK. In the UK concerns about the adversarial nature of collective bargaining practices were resolved through systematic derecognition of trade union competence and influence in the workplace. In Germany *Strukturpolitik* objectives have determined that potential adversarial impulses between employers and employees are extensively accommodated through legislative formulas. The existence of these frameworks has served to stimulate work place cooperation and the generation of shared goals and understandings[123].

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[123]The operational scope of works councils is defined in the *Betriebsverfassungsgesetz*. As a general rule a *Betriebsrat* comprises employees who are eligible to vote. The numeric composition of the *Betriebsrat* varies on the basis of company size. *BetrVG* §9 indicates that where companies have between:
5-20 employees, the *Betriebsrat* consists of one person,
21-50 employees, the *Betriebsrat* consists of 3 members,
51-150 employees, the *Betriebsrat* consists of 5 members,
151-300 employees, the *Betriebsrat* consists of 7 members,
301- 600 the *Betriebsrat* consists of 9 members.
Where the *Betriebsrat* comprises of 9 or more members, a Works Council Committee (*Betriebsausschuß*) is formed, consisting of the chairman of the *Betriebsrat*, the chairman's deputy and 3 additional members of staff (*BetrVG* §21(1); §60(1)). The responsibilities of the *Betriebsrat* are as follows: (i) ensure that all laws, ordinances, accident prevention documentation and measures, collective bargaining agreements and plant agreements which relate to an employee's life at work are upheld; (ii) propose modifications to the management of any measure which serves the interests of the workforce and business; (iii) ensure that there is gender job equality in terms of position, training, development and promotion; (iv) consider the ideas and stimulus provided by employees and 'Young worker and Trainee Representation Teams' (*Jugend- und Auszubildendenvertretung*), and negotiate solutions with management if such are justified. The *Betriebsrat* is also obliged to inform employees of the status and result of such negotiations; (v) promote the integration at work of severely handicapped and otherwise vulnerable individuals in society; (vi) organise the elections of the *Jugend- und Auszubildenden-*

It is argued here that a reduction in the functional capacities traditionally performed by trade unions in the workplace diffused company skills ideally suited to corporate environmental management. The increased complexities characterising organisational, vocational and authority relations confute binarised understandings of corporate relationships and is more accommodating of the representational, cooperative and consensual roles which can be assumed by trade unions in modern economies. The demands of new competitive forces (DTI 1998a) have encouraged a reassessment of organisations previously perceived as predominantly technological systems as socio-technological systems through which greater output productivity can be secured where the interdependence between job functions and social relations is recognised and utilised. Trade unions have been traditionally responsible for articulating workforce needs to employers based upon intimate knowledge of shop floor practices. The absence of mediating capacities committed to addressing the individual and collective concerns of workers has weakened employee identification with corporate practices, products and an important sense of enfranchisement at work. The author argues that corporate environmental commitment equally requires the exploitation of workers' expertise and commitment, a prerequisite of which is an accommodating company culture which promotes employees' identification with the corporate product and processes through an appropriately trained and secure workforce. It can be argued that trade union participation in collaborative company exercises has served to vocalise and secure those employee interests, which contribute to high quality employment training and conditions, factors which would otherwise be discretionary considerations of management.

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vertretung and to closely work with it in accordance with the requirements of §60(1), which states that a 'Young Worker and Trainee Representation Team' can be formed in companies with at least 5 employees under the age of 19 (*jugendliche Arbeitnehemer*) or where employees under 26 years are undergoing training. The *Betriebsrat* should also forward the Team's ideas and point of view to management; (vii) promote the employment of older employees in the company; (viii) promote the integration and understanding between Germans and non-Germans employees at work.
In order to perform these tasks the employer or management team must provide the *Betriebsrat* sufficiently detailed information and within reasonable time.

Company apparatus such as the *Betriebsrat*, *Betriebsausschuß*, Works Councils and Committees, represented by trade unions, employees and employers, have been central in decision-making processes aimed at realising management objectives through company resources. Corporate expertise in relation to issues such as personnel, business organisation and health and safety is directly relevant and immediately transferable to processes linked to EMS development and Environmental Programme Management.

6.3 Finance and SMEs

In both the UK and Germany claims drawn from anecdotal sources and empirical research describe SMEs as financially disadvantaged, partly as a consequence of competition with larger companies which can generate larger financial volumes through internal enterprise and partly in view of comparative difficulties experienced by smaller companies seeking long-term funding. However, surveys indicate that the nature of financial support is uneven (Dow 1994; Martin 1995). These collective differences may have implications for company attitudes towards, and behaviour in relation to, engagement in corporate projects, such as environmental improvement, where company finances or access to finances are finite.

In the UK the tendency has been for long-term savings to be invested via pension funds, building societies and insurance companies, a development which has muted the long-term lending ability of banks, whilst building societies have not offered corresponding long-term lending opportunities to UK companies (Callen and Lomax 1990). Compared to Germany, UK insurance companies have provided a limited range of long-term services to industrial companies and investment tends to be made on the tradable securities of firms (Appendix C, Tables C.9 and C.10). The majority of UK SMEs have not benefited from pension fund capital since these funds focussed on investments for larger publicly traded corporations with high liquidity and low costs at the cost of UK SMEs (Blake 1992). Research conducted on the nature of bank credit throughout European regions by

Martin (1989) and Mackay and Molyneux (1996) would suggest allocated financial, banking and investment capital is both geographically and operationally concentrated in the South East of England, in contrast to countries such as Germany where regional impositions work against gross clustering tendencies. Their findings are supportive of Dow's (1992, 1994) theory of relative liquidity preference, in which he maintains that where financial integration and free movement of capital is coupled with a propensity of financial institutions to centralise their operations and so enhance capital accumulation or economies of scale, the finance of financial systems and financial systems themselves will gravitate towards spatial centralisation. Therefore, regions of economic decline will experience perpetual disinvestment, initially, due to immediate economic weakness and subsequently, in view of unwillingness on the part of stakeholders to directly invest in areas of financial and investment exodus when centralised investment options are available. SME mortality rates are unavoidably influenced by economic developments within regions which increase the risk factors associated with their operation and limit their access to capital investment. These manifestations are likely to be more pronounced where regional policies do not aim at offsetting regional resource drain[124]. The most important source of financial support for

[124]German financial regional policy which also supports the *Mittelstand* is articulated by Articles 104a, 106 and 109 of the *Grundgesetz*. *Grundgesetz* §104a (*Verteilung der Ausgaben auf Bund und Länder* - Federal fiscal distribution to the *Länder*) is at the foundation of the interrelated jurisdiction for regional policy of Federal and regional government. It establishes that the Federal and *Länder* governments have separate responsibilities for expenditure arising from their constitutional duties. This means the *Länder* governments are primarily responsible for the expenditure ensuing from its activities and, in harmony with §109, the fiscal administrative responsibilities within the regional boundaries of its governance. However, where a regional government carries out duties on behalf of the Federal government, the Federal government is responsible for expenditure arising. The precedent enabling "Federal government powers to grant regional governments financial support for especially important investments required by themselves or local community or associations in order to prevent the destruction of the economic equilibrium in a *Land* government or to promote required economic growth" indicates that although the *Länder* governments exercise administrative autonomy in connection with Federal government, they are nevertheless 'subject' to higher government for fiscal and financial aid and need to comply with the macro-economic aims of higher government if federalism is to effectively function. In the UK the Local Government Act 2000 aims at offsetting regional inequalities. The Act decrees that every local authority is to have the power to do anything which they consider is likely to achieve anyone one or more of the following objects: i) the promotion or improvement of the economic well-being of their area; ii) the promotion or improvement of the social well-being of their area, and iii) the promotion or improvement of the environmental well-being of their area. The power under Section 2, subsection 1 includes power for a local authority to incur expenditure, give financial assistance to any person and provide staff, goods or services to any person to achieve the objectives of these aims. Limitations placed on Section 2, subsection 1 prevent local councils raising money to achieve its stated aims or to override prohibitions defined by an enactment or override a decree passed by the Secretary of State.

SMEs has been the clearing banks[125]. Since overdraft interest rates were not fixed, UK SMEs using this facility could not guarantee low interest rate costs over the duration of their loan. UK SMEs often found access to bank credits during periods of economic or company buoyancy was relatively easy, but during recessionary periods or company hardship, paradoxically SMEs were likely to have their credit facilities restricted (Bank of England 1991, 1994; Hutchinson and McKillop 1992). The over reliance of particularly UK small firms on bank overdrafts is symptomatic of the underdeveloped services that have been available to them. The comparatively limited official data held on SMEs in the UK, the limited knowledge of particular SME financial circumstances, and unfamiliarity with a company's potential within its market or future preparedness to honour arranged payments amount to a portfolio of uncertainty for lenders (Williamson 1975).

Although the initial reliance on asymmetric information of SME owners and concerns about the capacity of an SME to honour its contract can be offset by the provision of an economic and market exposé by the SME owner as well as introducing contractual terms which diminish bank loss in the event of company failure, the perception has been that these measures compound the compliance costs of engagement with financial institutions (Binks, Ennew and Reed 1992). SMEs with limited company collateral often feel discouraged from entering financial contracts which tie in collateral as an insurance requirement. Under such circumstances fixed term and renewable overdraft facility periods and variable interest rates have proven to be a more viable proposition than loans.

The majority of cross-country surveys conducted in the last twenty years on SME external finances conclude that German financial support services have been more considerate of small firm requirements and vulnerabilities than UK financial support

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[125]The Banking Act in 1926 legitimised and encouraged competition between joint-stock banks and the Bank of England. An insurgence of joint-stock bank buy-outs of each other and smaller savings banks followed. Since other forms of bank ownership were either restricted or not legally viable, the UK domestic commercial banking sector has essentially evolved around a few London-based clearing banks. For a detailed review refer to Sykes (1926), Sayers (1967), and Sheppard (1971).

services[126]. The *Mittelstand* have been more likely to secure bank loans than UK SMEs and benefit from long-term, fixed interest rates. In addition, regional *Mittelstandsförderungsgesetz* defines measures through which smaller German firms have access to favourable finance opportunities[127].

The *Mittelstand* has enjoyed for some time open and comparatively profitable relations with finance providers which both encourage and enable long-term financial and corporate planning. Access to a wider selection of qualitatively advantageous finance options, as in the case of the *Mittelstand*, extend company opportunities to engage in a wider range of corporate projects and company investment which heighten competitive advantage. Such financial factors more readily complement the embrace of environmental management which may have relatively high immediate and short-term costs and longer-term financial benefits. The contrasting traditions of UK external financing of SMEs have often been discriminatory and fostered a climate of distrust between finance providers and SMEs. Also, conflicting attitudes towards environmental management and policies between the UK and the EU during the 1980's and mid 1990's worked against the UK benefiting from European structural funds set aside for environmental regeneration projects. Consequently many UK SMEs have simply overlooked or are reluctant to engage in government supported schemes and grants which require financial lending, perceived to be 'non priority'. A case in point was the Small Company Environmental and Energy Management Assistance Scheme (SCEEMAS) run by the Department of the Environment, which was aborted in January 1999 in view of low take-up rates (DoE 1996; IEM 1998a)[128]. Low response rates to the DTI's Acorn Supply Chain Project designed to help SMEs gain ISO 14001 and EMAS accreditation by using larger enterprises as 'mentors' for their SME suppliers is also indicative of muted SME environmental commitment

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[126]Refer to Appendix C, Tables C.9 to C.12 on SME sources of finance and related issues.

[127]Refer to BUNR (1997) and Deutsche Ausgleichsbank (1999) for details on other sources of environmental funding afforded to the *Mittelstand*

[128]Further information on UK SME involvement in EMAS implementation is available from the Environment, Business and Consumer Division of the DETR, the United Kingdom Accreditation Service (UKAS), IEMA, BSI, Association of Environmental Consultancies and The ENDS Directory.

(Project Acorn 2001; ENDS 2001n). UK SMEs have access to other subsidies through research programmes sponsored by Government (CEST 1995a, 1995b; ENDS 1993) or environmental organisations (Groundwork Foundation 1998). The Environmental Protection Act 1990, Part VIII, Section 153, outlines international programmes and Convention commitments which the Secretary of State would financially assist with the consent of the Treasury; national activities will include those of the Groundwork Foundation and Trusts, the Environment Protection Technology Scheme for Research and Development and the 'Special Grants Programme for Research and Development'. However, no distinct centralist or decentralist procedures for SME environmental support emerge from this legislation[129]. This is not to suggest extensive environmental support does not exist for UK companies but rather the capacities and suitability of environmental business support organisations in relation to firms, especially for SMEs, are neither apparent *vis-à-vis* current legislation nor are provisions necessarily consistent in terms of availability or quality throughout the UK regions.

6.4 Education and Vocational Training

Companies develop and exercise strategic capacities to ensure the survival of their practices. Such a strategy involves processes capable of embracing new techniques, products and new methods of communicating the value of its cultural products. Strategic knowledge draws upon internal resources and experiences such as those gained via research and development facilities or employees, or through the internalisation of external resources and experiences via training courses, business support organisations, consultants and competitors. In the face of increasing environmental liability measures substantive environmental training of key personnel within manufacturing industries is unavoidable, whilst the increase in ecological practices at the workplace and the multifaceted nature of environmental

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[129] "... Financial assistance shall be given in such form and on such terms as the Secretary of State may think fit and, in particular, assistance may be given by making grants (whether or not repayable), loans or guarantees to, or by incurring expenditure, or providing services, staff or equipment for the benefit of, the recipient..." Environmental Protection Act (1990), Part VIII, Section 153(3).

corporatism determine that sound environmental insight is a prerequisite of business practice. The voluntary and variable quality of UK vocational qualification provisions have contributed to employment practices which have further weakened employer commitment to staff training (Fox 1985, Berry-Lound, Chaplin and O'Connell 1991). Employers who contemplate providing their staff high quality training live in the fear that once an employee has been competently trained a poacher in the form of another employer may offer the trained employee a more attractive employment package. Since each company shares similar apprehensions concerning the loss of company investment in the form of personnel under similar conditions, the risk of forfeiture has been generally countered by a lack of competent training within companies. Consequently smaller companies, which tend not to be able to offer their staff as attractive employment packages as their larger counterparts, have in particular suffered from a drain on their human resources as well as an inability or unpreparedness to replace skilled personnel. The failure to address this serious shortcoming by introducing strict training regulations has much to do with commitment to the *laissez-faire* ideology at the heart of Thatcherism. This should not be confused with the principle of 'market competition' which has traditionally been a characteristic of Conservatism, but rather the strong deregulatory measures between 1979 - 1997, which weakened the power trade associations, trade unions or other bodies could exercise over the maintenance of quality training courses and its provision throughout UK business enterprises. Finance and market strategies of companies also perpetuate the paucity of quality employee training. The widespread practice of corporate spending on company acquisitions as a means of guaranteeing fast and healthy investment returns resulted in the claim that a short-termist industrial outlook governs UK enterprise practice at the cost of longer-term investment. Companies which failed to maximise shareholder wealth by increasing share valuations and boosting dividends held themselves to be potential take-over targets for companies engaged in those practices. The provision of neither sizeable short-term investment for staff training, nor the provision of longer-term investment for

workforce training or R+D is encouraged by the availability of short-term capital in the form of company shares. In periods of crisis or share losses, UK companies have been more inclined to use the option of dismissing staff in order to quickly offset deficits. This practice also works against the direction of large investment sums towards staff training. For these and related reasons many companies have had to endure skill shortages[130]. In the face of changing technologies, companies tend to familiarise their staff with the new technology, but often this occurs without workers acquiring a thorough knowledge of the base technology itself. Under such circumstances accumulative synergies between related technologies and methodologies are neither fully recognised nor realised. Poor performance by business support organisations or business consultants adversely prejudiced the perceived value of training and training services. Secondly, the industrial climate in which companies exist and survive configures company culture. Important psychological attributes in the process of company selection as determined by the UK industrial climate are self-sufficiency, independence and enterprise. Traditionally, UK SMEs which successfully compete in the market place have done so with minor state intervention and the development of survival strategies through their own management teams. Their experience would often lead them to conclude that the adoption of systematic staff training is a counter-intuitive, untested and potentially costly exercise with no guaranteed returns (Storey 1994, p. 145). Introducing staff training may also engender a sense of inadequacy amongst management teams which find themselves confronted by employees suggesting alternative operation methods. Managing directors may be discouraged not only by the financial costs of training but the psychological implications of knowledge. Voluntary exposure to new 'truths' may force company directors to consider business related issues from perspectives which demand both subtle and radical re-configurations of business practices which would involve considerable time and

[130]The situation in the UK was considered to be serious enough for the CBI to launch an investigation into the claim that the market emphasis on short-term financial gains was resulted in a serious dereliction of stakeholder interests (CBI 1987). Although no corroborating evidence was found to support allegations of wide scale employee and supplier neglect during that political period, financial practices which promoted shorter-term rather than longer-term company strategies were felt to have a negative impact on the commitment to concentrated social capital investment .

resources to introduce. Management may also conclude that introducing such measures under existing terms could even jeopardise business stability and survivability (Atkinson and Storey 1993, Storey 1994, IoD 1996, Bridge, O'Neill and Cromie 1998).

Negative attitudes towards vocational training and its efficacy, particularly pervasive amongst SMEs, undermine forms of environmental commitment dependent upon the acquisition of new ecological insights and knowledge derived through training. Therefore, even where general concern for the environment may be high amongst companies, translating environmental cognition into conation may prove difficult in enterprises with poor quality training traditions. Also, environmental training may prove difficult to justify where expertise is low in business areas considered more critical to company survival. The character of corporate environmental training shares much in common with the vocational system of which it is a part. A system, which allows training provision of variable quality or without uniform certification standards, undermines the aims of consistently applied pollution prevention, waste minimisation and de-materialisation practices at the heart of corporate environmentalism. Despite pronounced decentralist tendencies in training provision four, at times overlapping, paths for environmental career development have emerged in the UK, namely,

(i) Membership of Professional Environmental Bodies;

(ii) Graduate and Postgraduate qualifications through universities and colleges;

(iii) NVQ Training;

(iv) Training course attendance devised by environmental consultancies or Environmental Standards Institutes.

Membership of Professional Bodies is an attractive option for individuals seeking networking opportunities and access to quality environmental support. Such bodies often run courses through which professional qualifications and certification can be obtained or serve as a gateway to professional training suited to the specific requirements of the members. Professional bodies may also enjoy a measure of

political influence as a consequence of their specialist contributions and large membership[131]. Graduate and Postgraduate environmental training opportunities are wide but outcomes can be difficult to quantify in view of the different subjects studied and the various emphases placed on course content. These factors will influence the applicability of acquired skills in vocational settings. However, research grants are linked to programmes funded by the European Commission and the Secretary of State as part of the Government's strategy for science, engineering and technology[132]. Since such projects target specific scientific and environmental concerns of industry they contribute to the enhanced industrial competitiveness of the UK as well as high quality research and training outputs.

NVQ Environmental Management Training is designed to apply to managers and senior staff in the widest range of organisations in the public, private and voluntary sectors including both manufacturing and service industries. The principal NVQ Environmental Training manual emphasises its relevance to managers in SMEs who seek managerial understanding of environmental-corporate relations and the ability to significantly improve the environmental performance of their organisations. Although specific technical or scientific knowledge for addressing environmental problems is not contained in the manual there is sufficient scope for its references to be applied by candidates (MCI 1998). The strength of the NVQ in Environmental Management is that it marries theoretical knowledge in relation to sustainable practice with experiential knowledge gained through workplace practice. The

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[131]The Institute of Management and Assessment (iema) was formed in 1999 through the merger of the Institute of Environmental Management (IEM), the Institute of Environmental Assessment (IEA) and the Environmental Auditors Registration Association (EARA). Members of this new professional body have access to integrated expertise and certified corporate environmental training governed by uniform standards, access to environmental fora, information and research findings conducted by the organisation and networking opportunities amongst members. IEMA Membership is possible at Affiliate, Associate and Full levels. Associate membership is established through open book assessment whilst Full membership requires a broad knowledge across the environmental management and assessment disciplines, together with the practical capability to make environmental improvements in organisations. In addition to presenting a written paper, applicants will engage in a panel interview (IEMA 2000).

[132]Funding from the Biotechnology and Biological Sciences Research Council, Engineering and Physical Sciences Research Council and the Economic and Social Research Council can be obtained by academic institutions for research in environmental fields. Clean Technology grants and projects have been available through the BBSRC and EPSRC, covering research topics such as the clean synthesis of effect chemicals, waste avoidance within the production process, fuel cells, clean combustion, pollution analysis and measurement and life cycle analysis.

anticipated course duration is 18 months through accredited awarding bodies (ENDS 1998b, p. 8, 9).

NVQs have been criticised as a weak alternative to apprenticeships generally available on the continent, which demand higher levels of applied knowledge and skills development. Since the modules of the NVQ assess the manner of task completion specific to a given operation, it is argued that many of the skills are not truly transferable. Concerns have also been raised about the capability of personnel to capably and uniformly assess trainee progress at the workplace (Prais 1995). In defence of the NVQ Scheme, criticism concerning the literacy, numeracy and educational attainments of NVQ trainees and, by extension, the value of the NVQ certificate, fails to recognise the objectives of NVQ training and examination. The aim of NVQ training is exclusively to demonstrate that individuals are competently performing their job and course modules will, therefore, specify the knowledge and skills required to achieve competent performance. Additional knowledge and skill requirements can be addressed by attending appropriate courses. The range of NVQ levels account for the office junior through to the senior company manager, who would have different levels of company knowledge, but nevertheless need to effectively conduct their operational duties by reaching benchmarked standards.

In contrast to the UK vocational model the German vocational system provides for prescribed and longer initial vocational training which substantially limits future vocational options but simultaneously increases remuneration prospects and job security. This pattern of training is repeated on all technical levels from the college-trained graduate through to university-trained engineers and also applies to vocational patterns in the service industry, including banking and insurance industry, or other industry sectors. In all vocational instances there is a strong relationship between the level of training received as a function of educational achievement, and employment status or remuneration received as a function of

conferred responsibility in the workplace. There are two central cords to German vocationalism; firstly, the consensus reached by large enterprises in determining future skills and training methods of employees, and secondly, the acceptance of trade unions through the professional trade associations that the available qualifications and training methods will protect the position of employees in the short and longer term (BMBW 1994). Both of these processes, despite their analytical differences, are conceptually and methodologically interrelated as demonstrated by the ongoing negotiations and agreements these two parties form.

The nature of vocational and educational standards owes much to the philosophy of *Strukturpolitik*. Coordination of industry has been achieved through trade associations, which represent their specific industry sectors, alongside employers associations and trade unions, which have the commitment of both employers and employees. Companies invest trust in the abilities of the employers' associations to provide qualifications which serve vocational interests and that the cost of training requirements can be met by large, medium-sized and the majority of small enterprises. Employees also invest trust in the abilities of trade unions to reach agreement on the nature of training and skills which have general and long-term value and therefore remain sources of justifiable personal investment. The outcome of this process is the creation of quality apprenticeship programmes which provide trainees with genuinely marketable skills on completion.

The most important facets of the German education system are apprenticeships in the form of a dual system of vocational training and study leading to professional qualifications as defined by the *Berufsbildungsgesetz (BBiG)*[133]. Dual vocational

[133] The *BBiG* provides the framework for the development, responsibilities associated with, the supervision and running of vocational programmes in Germany. Apprenticeship availability is determined by regional market supply and demand forces, namely, the willingness of companies to offer apprenticeship places and the preparedness of primarily school leavers to apply for these positions. The *BBiG* prescribes a dual pedagogical path of learning comprising skills development at the place of work and at a vocational school. There are currently more than 390 official apprenticeships covering the spectrum of occupational options afforded by industry. Training Regulations map out how vocational courses should be described and named, the duration of each course, course content, the skill level to be attained by each course, course examination requirements and the conditions attached to the phases of specialised training (*Stufenausbildung*). Vocational training offered at the place of work is diverse, ranging from the facilities of micro-enterprises to training departments and specialist centres of large

systems of vocational training comprise learning on the job within a company plus education and training at a vocational school. In-house training serves the dual purpose of equipping trainees with technical expertise alongside social management and business management skills. Despite the absence of legislation enforcing compulsory training the majority of German companies do offer apprenticeships to employees between the average ages of 16 and 19, and thorough training for other employee groups (BMBW 1994).

Indirect conditions are also important factors in the shaping of German vocational training. The apprentice receives a low wage during the three-year training period. Expertise from trade unions, industry and employer associations help to keep start-up costs low and the tuition of apprentices is partially subsidised through an apprenticeship payment (*Ausbildungsvergütung*). Collective bargaining establishes the levels at which different apprenticeship payments are and minimal annual holiday periods for trainees. However, overall costs associated with staff training can be high (Prais 1995). Importantly, German enterprises have access to long-term finance capital. Without this type of finance investment in education and vocational training would be less attractive for companies since it is a longer-term investment without guaranteed returns. Secondly, German industry sectors have not encouraged aggressive national competition between members of the same industry sector within the German market (BMBF and BMWi 1997). The traditional convention has been that an evaluation of competence requirements is only possible where a measure of inter-company cooperation exists. Thirdly, the bond in the system of labour relations between influential trade unions and works councils has empowered the development of innumerable information networks which contribute to the stability of the vocational training and education system. The inclusion of works councils in the process of educational standardising offsets

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enterprises. In each instance apprentices are tutored by certified trainers and '*Meister*' qualified to the teach in the given field. In both a general and a specific sense the chambers (chambers of commerce, craft enterprise chambers, chambers of agriculture (*Landwirtschafts-kammer*), General Medical Council (*Ärztekammer*), etc) are responsible for vocational training. They hold lists of which trainee courses exist and index training course contracts of companies, oversee the running of company vocational training and carry out the examinations (intermediary exams, final exams and further training exams.

the potential conflict between trade unions, which represents both low and highly qualified workers, and works councils, which may gravitate towards the interests of higher qualified personnel. This bond also allows the system of collective wage bargaining to develop alongside the system of qualification and training development. Fourthly and finally, the role of the State is pivotal in the construction of the framework and information gateways through general support on a political level and more directly through the Federal Institute for Vocational Training (*Bundesinstitut für Berufsbildung*).

Two other important factors influence the system of qualifications and training in Germany. The first is concerned with the relations between large and small enterprises. Larger German companies primarily engage in the re-development and applied improvement of training programmes with the result that such companies introduce new standards before their official formulation by training institutions. The spread of especially technical expertise from large to smaller enterprises is of particular importance in the German system. For vocational training development this means the standards are defined only at the end of a process after the majority of enterprises already possess in-house training programmes which surpass in quality and depth the requirements of existing standards. The second element relates to the qualifications of engineers. Again a dual approach is employed which marries a consensus of future industry requirements with career perspectives of apprentices. Career opportunities and options are essentially defined on the basis of education level. College-trained engineers share a similar career path with general employees. The *Verein Deutscher Ingenieure* (Engineers Trade Association) plays a key role in cooperation with the Industry Associations in the development of college programmes (Christ 1991; VDI 1993; BMFT 1994). At the same time there are a number of institutions which ensure that students secure a place at a local company engaged in a research project. Thereby new skills and more flexible and efficient working methods are utilised which are absent from the existing apprentice

system but which ensures a thorough programme of development. Technical universities have indirectly introduced new elements to the education and vocational training system (BMBW 1994, BDI 1996). Highly respected Commissions, represented by professors and research directors from diverse disciplines, hold conventions, quite independently of their normal roles, in a Commission of Industry Associations. In this way the most important scientists, who conduct the majority of research for the leading enterprises, can meet company representatives, to discuss future technological development and the placement of doctoral candidates.

The activities of German vocational environmental education relate to the activities in three different areas: (i) Education in the framework of the dual system, (ii) vocational training, (iii) further and advanced education. Environmental education as a defined category entered German vocational structures through environmental protection programmes in the early 1980s, during which time the professional categories of *Versorger* and *Entsorger* (Waste Managers of Waste Minimisation and Waste Disposal) were created. Since the early 1980s all education ordinances passed have included compulsory environmental requirements (BiBB 1999). In the framework of the dual education system the responsibility of the vocational schools has been on conveying basic understanding, values and knowledge about the consequences of positive environmental behaviour and waste avoidance strategies. From 1988 environmental learning objectives and vocational contents have been an exclusive part of all vocational programs, with specialist courses in environmental technology. Since the Federal Main Committee of the Federal Institute for Vocational Training (*Bundeshauptausschuß des Bundesinstituts für Berufsbildung* (*BIBB*)) introduced the legislative recommendations to include environmental issues in all vocational training the demand has grown for the development of all integrated forms of qualifications for certain types of vocations which have similar environmental impacts and profiles (BIBB 1999). Opportunities for further education measures are also the consequence of the increasing

environmental regulatory requirements which determine that companies need to take more environmental and ecological factors into account in their operational equations. Since the acquisition of required competencies is not normally possible in-house, training is for the most part conducted by external agents. The Chambers of Commerce play an important role in this regard as facilitators of information or education programs, which cater for the specific environmental needs demanded by company enterprise (IHK 1997). In addition specialist education and training programmes offered by environmental consultants are widely used by corporations. Further education in the form of postgraduate qualifications is widely available through universities and higher education colleges[134]. Such courses focus on the development of environmental management aptitude and understanding environmental technology within the various legally defined areas of environmental responsibility[135].

[134] For a definitive review of postgraduate environmental training refer to the *Studienführer Umweltschutz* (UBA 1998).

[135] For example, *Abfallbetriebsbeauftragte(r)* for waste (§ 54 *KrW-/AbfG*); *Gefahrgutbeauftragte(r)* for dangerous (§ 3(1.14) of the *Gesetz zur Beförderung gefährlicher Güter (GBefGG) /Gefahrgut-beauftragten-verordnung; Gewässerschutzbeauftragte(r)* for effluents (§ 21a-f*Wasserhaushalts-gesetz (WHG)); Immissionsschutzbeauftragte(r)* for emissions (§ 53-58 *BImSchG); Störfall-beauftragte(r)* for hazards and safety (§ 58a *BImSchG* and 5. *BImSchV Verordnung über Immissionsschutz- und Störfallbeauftragte.*

7 RESEARCH METHODOLOGY AND DATASET

The objective of this research is to investigate the environmental values, attitudes and actions of SMEs in the UK and Germany within defined manufacturing industry sectors. This investigation involves the use of a corporate environmental consciousness research model alongside quantitative and qualitative research methods. Quantitative information enables objective firm characteristics and activities to be traced and identified. Qualitative information serves to compliment insights drawn from quantitative examinations or provide additional insights into research examinations which were not explicit through quantitative examinations. It is to this research model and these techniques that we now turn.

7.1 Situating Corporate Environmental Consciousness

Corporate environmental consciousness is examined through a theoretical research model based upon the environmental consciousness dimensions graphically presented in Figure 1.2 and contextualised in Chapters Two to Six. The defined model comprises four theoretical constructs represented in Figure 7.1 described as:

(i) Company Culture

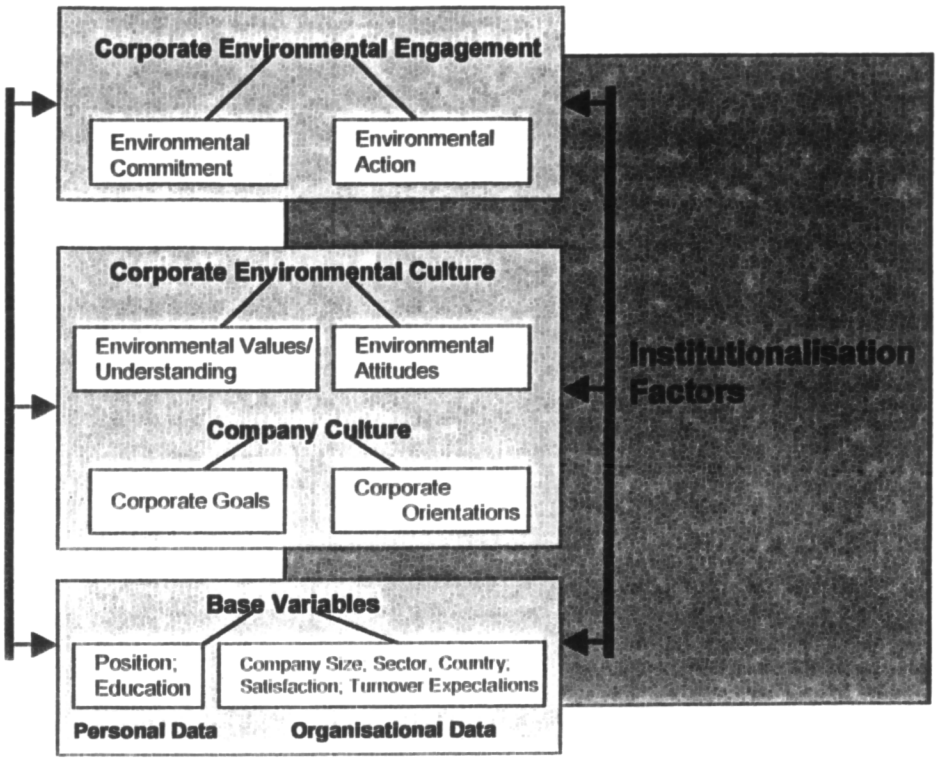
(ii) Corporate Environmental Culture

(iii) Corporate Environmental Engagement

(iv) Institutionalisation Factors

Existing models of environmental consciousness have been applied to business enterprise (Fietkau and Kessel 1981, Winter 1987, Hammerl 1994, Sietz 1994a, Nussbaum 1995, Haan and Kuckartz 1996, Huse 1996). However, these models tend not to involve an integrative examination of its conative, affective and cognitive aspects nor do they consider the impact of institutionalisation factors identified in Figure 7.1. These factors are described as exerting variable degrees of socio-economic influence, predisposing theoretical and applied inclinations, aspirations and behaviours (Urban 1986).

Figure 7.1: Corporate Environmental Consciousness Research Model



7.2 Quantitative Research Methodology

Quantitative research methodologies make use of questionnaires and statistical analyses in order to establish underlying patterns and commonalities between surveyed groups, through which improved understanding of variable relationships can be gained (Robson 1993). As implied earlier, one of the shortcomings of quantitative methodologies is its fixed framework may fail to capture essential details in view of the aggregate nature of analysed data. Another weakness of quantitative approaches is that, without the qualifying rationales of qualitative methods, the hypothetical basis upon which research is conducted may be misdirected (Yin 1996, p. 28).

The quantitative data for this research were formulated through a postal questionnaire. The questionnaire structure determined that responses from UK and German firms were made on the basis of uniform categorisations. Patterns of similarity and dissimilarity between respondents could be effectively examined on this basis.

Quantitative data analysis supports the central aim of the research model which is to establish whether relationships exist between selected independent variables and dependent variables. Statistical tests undertaken should limit the risk of erroneous correlations between examined values being formulated which result in an incorrect interpretation of variable relationships. In traditional significance testing an experimental hypothesis is tested alongside a negated hypothesis described as a null hypothesis (H_0). Statistical tests aim at establishing the probability of a specific event occurring from a set of possible events, expressed as a proportion. If the probability distribution or p-value of a test is small, this is used as evidence against H_0, since the likelihood of a probability distribution value of that size, although possible, is very low. When the p-value of a statistic is less than the significance level, the value of the statistic is described as being significant. Where the p-value is larger than the significance level, H_0 is accepted on the basis that

insufficient evidence has been recorded to justify the claim of significance (Hinton 1995, Gravetter and Wallnau 1996).

For the purposes of this research:

(i) If the p-value is greater than 0.05, H_0 is accepted and the result is not significant;

(ii) If the p-value is less than 0.05 but greater than 0.01 H_0 is rejected and the result is significant beyond the 5 percent level;

(iii) If the p-value is less than 0.01, H_0 is rejected and the result is described as significant beyond the 1 percent level.

In this study Chi-square (χ^2) tests are performed to examine the effects of independent variables or base variables on the data provided by respondents, allowing these data to be categorised in support of or not in support of the presented research hypotheses. The Statistical Package for Social Scientists (SPSS) was used to conduct the χ^2 tests (Pearson's r statistical test). Instances of negated hypotheses will be cited with significant hypotheses where this is considered to be relevant.

Establishing relationships between variables requires that the distribution of scores or values of an examined variable is linked to the distribution of values on another variable. Factor analysis is another way in which particular relationships within a large number of correlations between variables can be identified by pointing to clusters of variables which are highly intercorrelated (Robson 1993). These 'factors' are theoretical constructs which replace a large set of variables with a small and more easily understood number of factors. They support the assessment of the extent to which questions in relation to data are in fact measuring the same concepts or variables.

7.3 Research Questionnaire

The postal research questionnaire was developed in the English and German languages with closed questions to provide a consistent basis for the interpretation and analysis of research data used in the Corporate Environmental Consciousness Model. The largely objective nature of the questions and statements in this questionnaire determined that many of the semantic and inferential challenges peculiar to the translation exercise were not encountered by the author[136]. The postal questionnaire results are based on variables drawn from the four levels of the Research Model represented in Figure 7.1, which are described below.

7.3.1 Independent Variables

The independent variables are formulated in six questions which capture personal and company details of respondents:

Questions 1.1 to 1.4.

The questions on 'Company Details' refer to the company size, industry sector of the respondent, satisfaction levels associated with company performance, and company turnover expectations over the next three years. The 'Personal Details' questions refer to the position of the respondent and the level of education attained by the respondent. Respondents also had the opportunity to express their own views on the research questionnaire or environmental issues of relevance in the 'Concluding Section' in the postal questionnaire.

7.3.2 Company Culture Variables

Company Culture variables are associated with the following questionnaire questions:

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[136]Refer to Appendices A.1 and A.2 for the English and German Postal Questionnaire.

Questions 2.1 to 2.4; Question 4.6; Question 5.14.

In Chapters One and Two corporate strategy was discussed in relation to traditional competitive enterprise and environmental impulses animated from within and without the firm (Porter 1985, Beer and Troge 1989, Storey 1994, Mugler 1995, Pleitner 1995, Seidel and Weber 1995, Groundwork 1998). Accordingly Questions 2.1 and 2.2 record whether firms were satisfied with their corporate performance and expectations during the following three years. Question 2.3 aims at establishing what respondents consider are the most important corporate goals during the next three business years whilst question 2.4 considers the nature of important environmental investments companies have made to date. Question 5.14 records the level of other management system use within SMEs such as the QMS which is employed to enhance corporate competitive prowess and, it is argued, can provide a sound basis for EMS development (Borri and Boccaletti 1995, Schwerdtle and Bräunlein 1996).

7.3.3 Corporate Environmental Culture

Corporate environmental culture variables are associated with 11 questions:

Question 3.1; Question 3.2; Question 3.3; Question 4.1; Question 4.4; Question 4.5; Question 5.2; Question 5.3; Question 5.5; Question 5.7; Question 5.9.

In Chapter Three the cognitive dimensions of environmental consciousness were identified as comprising notions of value and attitude. Environmental values implicate instrumental and object oriented factors (Rokeach 1973) as well as socially defined risk sensitivity (Douglas and Wildavsky 1982, Kasperson et al 2000). Environmental attitudes were described as mediating between espoused values and actual behaviour. Question 3.1 aims at identifying corporate attitudes and concerns of firms which relate to environmental practices and society at large. Question 3.2 frames company attitudes in relation to environmental behaviour and institutional values encouraged within SMEs. In Chapter Four the potential impact

of applied environmental principles on behavioural change was discussed and directly linked to existing institutional values embodied in environmental legislation. Question 3.3 extends the examination of the themes introduced in Question 3.2 by aiming at assessing attitudes towards the impact of national environmental values, defined via principles, legislation and instruments on SMEs. In Chapter Three company environmental learning was explored and described as mirroring actual corporate environmental commitment (Argyris and Schon 1978, Finger et al 1996) or being indicative of corporate capacity for such commitment (Kirsch 1990). In this regard Question 4.1 aims at identifying attitudes towards ecological learning within smaller firms and corporate factors supportive of environmental commitment. Similarly Questions 5.3, 5.5, 5.7 and 5.9 investigate respondent familiarity with EMAS and ISO 14001 as key instruments in the diffusion of ecologically relevant knowledge (Hammerl and Rosenstiel 1996). Question 5.2 identifies whether responding firms know whether they are legally obliged to make individuals responsible for carrying out environmental practices. Questions 4.4 and 4.5 focus on the perceived problems and advantages associated with EMS implementation highlighted by authors cited in Chapters Two and Three, including Hutchinson and Hutchinson (1995), Emerson and Welford (1997b), Seidel and Weber (1998), Fietkau (1984) and Pautzke (1989).

7.3.4 Corporate Environmental Engagement

Corporate Environmental Engagement is concerned with 10 questions:

Question 4.2; Question 4.3; Question 5.1; Question 5.4; Question 5.6;
Question 5.8; Question 5.10; Question 5.11; Question 5.12; Question 5.13.

In Chapter Five the conative aspects of corporate environmental consciousness were defined through the elements of the Eco-Management and Audit Scheme and ISO 14001 environmental management systems (Council Regulation (EEC) No 1836/93, (EC) Regulation No 761/2001, BSI 1996a). Environmental engagement

conducted by UK and German SMEs was described as being framed by the institutional values explored in Chapter Four and attitudes towards commitment to EMS elements. In an examination of this argument and the research model definition of Corporate Environmental Engagement the following questions aim at quantifying the form and levels of environmental engagement undertaken by smaller firms. Question 4.2 establishes whether environmental guidelines are specified in writing within a firm. Question 4.3 identifies environmental measures considered to be of importance in SMEs. Question 5.1 identifies which responding firms used or planned to use an EMS. Question 5.4 identifies companies with or intending to introduce EMAS. Question 5.6 identifies responding companies with or intending to introduce ISO 14001. Question 5.8 identifies which EMAS elements have been employed in SMEs. Question 5.10 identifies which ISO 14001 elements have been employed in SMEs. Question 5.11 identifies whether an environmental programme has or environmental responsibilities have been assigned to the workforce. Question 5.13 identifies which members of staff share in the development and implementation of environmental measures.

7.3.5 Institutionalisation Factors

Institutionalisation factors involve the consideration of 7 questions:

Question 6.1; Question 6.2; Question 6.3; Question 6.4; Question 6.5; Question 6.6; Question 6.7.

Environmental consciousness defined in Chapter Three and corporate environmental consciousness represented in Figures 1.2 and 7.1 cannot be fully understood without reference to the impact of institutionalisation examined in Chapter Six. This is described as a range of socio-economic factors which shape the form and tone of environmental values, attitudes and engagement (Urban 1986, Kasperson et al 2000). The following questions aim at identifying SME attitudes towards agencies which are supportive of corporate environmental engagement.

Question 6.1 identifies whether responding companies had experience of external advice or support. Question 6.2 records the quality of external consultancy received. Question 6.3 identifies whether respondents would request external support if introducing an EMS. Question 6.4 identifies the anticipated nature of environmental support. Question 6.5 identifies the source of the anticipated environmental support. Question 6.6 identifies the type of support SMEs with an EMS would recommend receiving. Question 6.7 identifies the source of recommended environmental support.

7.4 Telephone Survey Questionnaire

A telephone survey questionnaire was designed for use during the initial telephone contact made with firms. It aimed at including a range of companies in the research process which did not wish to complete the postal questionnaire but were prepared to indicate why they felt completing the postal questionnaire was inappropriate. These companies were invited to briefly express their views about environmental management[137].

7.4.1 Independent Variables

The independent variables capture company details of respondents. These details refer to the company size, company sector and company name of respondents.

7.4.2 Grounds for Postal Questionnaire Refusal

Respondents were invited to state the reason or reasons why they did not wish to complete the postal questionnaire. The four grounds for refusal generally cited by respondents were as follows:

(i) 'Just not interested'

(ii) 'No time to complete a questionnaire'

(iii) 'We don't generally fill out questionnaires'

(iv) 'Our environmental representative is not available'

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[137]Refer to Appendices A.3 and A.4 for the English and German Telephone Survey Questionnaire.

7.4.3 Company Culture Variables

Company culture variables are associated with Question 7 which identified the most influential individuals driving corporate environmental protection improvements.

7.4.4 Corporate Environmental Culture Variables

Company environmental culture variables are associated with the following questionnaire questions:

Question 3; Question 4; Question 8; Question 9.

Questions 3 and 4 aimed at identifying respondent familiarity with EMAS and ISO 14001 systems. Question 8 aimed at identifying perceived or experienced problems resulting from EMS implementation. Question 9 aimed at identifying perceived or experienced advantages resulting from EMS implementation.

7.4.5 Corporate Environmental Engagement Variables

Corporate environmental engagement variables were associated with the following questions:

Question 2; Question 5; Question 6.

Question 2 identified whether the responding firm used an EMS. Question 5 established whether the responding firm intended to introduce EMAS within the next 3 years. Question 6 established whether the responding firm intended to introduce ISO 14001 within the next 3 years.

7.4.6 Institutionalisation Variables

Institutionalisation variables were associated with Question 10. Question 10 identified the sources from which firms expect to receive environmental management support.

7.5 Postal Questionnaire Data Collection Method

The research model determined that a postal questionnaire survey was conducted to gain quantitative information on business activities and representative attitudes. The firms targeted for the postal questionnaire in the UK were selected from the commercially available 'Finances Analysis Made Easy' (FAME) Database holding details on all UK companies registered under the Companies Act (1985). German companies were selected via the *Unternehmensgruppe ABC Verlagshaus* Database holding details of all German companies registered in accordance with the *Handelsgesetzbuch.* These databases held information on the company name, address, telephone number, Managing Director and other contact persons, company size, the major type of industrial activity undertaken and the regional location of all companies. Firms were chosen from four industry sectors specified by Standard Industrial Classification (SIC) or NACE Codes. The sectors and industry codes are listed in Table 7.1:

Table 7.1: Research Survey Industry Sectors

Industry Sectors	SIC Codes
Chemicals, Rubber and Plastic Products	24, 25
Machinery	29
Pulp, Paper and Packaging	21
Food and Beverages	15, 16

Companies were selected from four regions in the UK and Germany which were considered to reflect varying concentrations of manufacturing production levels in the respective countries. In the UK regions key concentrations of manufacturing activity were identified as the North West, West Midlands and London. The UK region selected on the basis of having lower levels of manufacturing activity in the

prescribed industry sectors was East Anglia (Eurostat 1997b, ONS 1996, ONS 1998). In the Germany key regional concentrations of manufacturing activity were identified as North Rhein-Westphalia, Badenwuerttemberg and Berlin. The German region selected on the basis of enjoying lower levels of manufacturing activity in the prescribed industry sectors was Schleswig-Holstein (SBA 1997, Eurostat 1997b).

7.5.1 Pilot Questionnaire

Three pilot questionnaires were sent to companies in each of the UK and German regions. The twenty-four manufacturing firms were randomly selected from each of the four industry sectors. Each company had between 249 and 500 employees. This company size selection was made on the assumption that larger companies would have more environmental resources than smaller firms and would, therefore, be able to highlight weaknesses in the developed questionnaire. A follow up letter was also sent to boost responses. Table 7.2 summarises the pattern of completed and returned pilot questionnaires.

Table 7.2: Pilot Questionnaire Results

Status	UK	Germany	Total
Completed	3	3	6
Returned (Incomplete)	5	27	7
No Reply	4	7	11
Total	12	12	24

The overall response rate was 54% with 25% completion rate for questionnaires in both the UK and Germany. Returns were evenly distributed between the sectors. Subsequent telephone contact made with the companies proved to be particularly constructive for the postal questionnaire. Three significant shortcomings of the pilot study approach were highlighted:

(i) Both the UK and German company databases, despite the accuracy of the company address and contact details, did not always distinguish between companies which manufactured products and companies which were primarily retailers of manufactured goods.

(ii) Some companies experienced difficulties locating responsibility for completing the questionnaire; as a consequence some questionnaires were not returned or not returned promptly.

(iii) As a result of the high frequency of questionnaires received by German manufacturing firms in general on environmental matters there is a growing reluctance on the part of some firms to complete surveys where there is no legislative or mitigating reasons for doing so.

The postal questionnaire survey was conducted in two phases, namely, between January 1998 and April 1998 and October 1998 and January 1999. In view of the problems encountered during the pilot study it was felt that initial telephone contact with Managing Directors or company environmental representatives should be made to ascertain whether:

(i) the contacted company was primarily a manufacturing company;

(ii) an individual within a firm would take responsibility for the completion of the questionnaire.

It was envisaged that this strategy would secure a higher rate of questionnaire returns. A letter reintroducing the author was sent with each questionnaire. Given that the completion rate for the pilot survey was 37% (25%) it was decided that for the full study 720 firms would be targeted to yield a response rate closer to 40%. The company selection process also aimed at guaranteeing an even distribution of employment size, sectoral and regional returns for each country. Five Company Employment Size categories were defined as follows:

Size 1: 1-9 employees; Size 2: 10-49 employees; Size 3: 50-99 employees; Size 4: 100-249 employees; Size 5: 250-500 employees.

Telephone contact was made with randomly selected companies within the Employment Size, Industry Sector and Regional categories until 320 companies in

the UK and 400 companies in Germany which satisfied the questionnaire requirements had been contacted. Table 7.3 outlines the anticipated research selection criteria.

Table 7.3: Postal Questionnaire Targeted Companies

Country	Section Criteria	Categories Selected	Number of Companies
UK	Company Size	5	20
	Sector	4	80
	Region	4	320
Germany	Company Size	5	25
	Sector	4	100
	Region	4	400
Total			**720**

7.6 Telephone Survey Data Collection Method

The data collection method outlined in Chapter 7.5 revealed lower acceptance rates of UK and German postal questionnaires in the two smallest Company Employment Size categories, namely:

Size 1: 1-9 employees; Size 2: 10-49 employees.

Telephone survey data were collected from UK and German firms within these two Employment Size, Industry Sector and Regional categories, accounting for 64 UK and German companies, presented in Table 7.4. It was felt that these data would furnish important insights into the attitudes of micro and small firms towards the environment in view of anticipated low return rates of postal questionnaires from these firms.

Table 7.4: Telephone Survey Questionnaire Targeted Companies

Country	Section Criteria	Categories Selected	Number of Companies
UK	Company Size	2	4
	Sector	4	16
	Region	4	64
Germany	Company Size	2	4
	Sector	4	16
	Region	4	64
Total			**128**

7.7 Qualitative Research Methodology

Qualitative research methodologies involve 'open' investigative techniques which emphasise the *how* and *why* aspects of research questions which are not typically associated with quantitative approaches (Yin 1996). Qualitative research is more concerned with issues of causality and explanations of attribution, emphasising contextual particularity. A possible weakness of the qualitative approach is linked to data density ensuing from research examinations which may focus narrowly on particular details and obscure wider contextual relations or fail to address them. Also small research samples selected for qualitative investigations may not satisfactorily represent research questions aimed at meso or macro levels of investigation (Strauss and Corbin 1998).

In this study qualitative approaches compliment the analysis of quantitative research results through the provision of qualification and explanations of aggregate data patterns generated. In-depth interviews with company management served to gain further insights into the practices, rationales and corporate orientations of firms. Information drawn from interviews was also used to examine relational links between firms specified in the corporate environmental consciousness research model. The 'grounded theory' qualitative data analysis model first proposed by Glaser and Strauss (1967) and subsequently discussed by Turner (1981), Strauss (1987) and Strauss and Corbin (1990) also served research objectives since it allowed for post-hypothesis exploration of ideas derived from the initial quantitative research analysis process.

Exploratory or inductive research methods such as grounded theory have been criticised for their general lack of scientific rigour (Bulmer 1979, Alt and Brighton 1981) but it can be equally argued that more important than the nature of a research methodology is the way in which it is employed and the objectives of its application. This sentiment is also implicit in criticisms of grounded theory (Silverman 1993).

A number of caveats have been raised in relation to combining quantitative and qualitative methodologies as a consequence of the distinct philosophical basis for their enactment (Robson 1993). However, combining quantitative and qualitative methodologies need not be a source of conceptual conflict (Strauss and Corbin 1998). The use of quantitative and qualitative research methods for the purposes of this research can be described as complimentary since both methods serve the interests of a common research purpose. In-depth interview questions support existing quantitative research findings posited within the corporate environmental consciousness research model. Key comments were used to connect the interviews for comparative purposes and collective understandings in support of the postal research questionnaire described in Chapter 7.3. The coding procedure used by the author is described as the 'conditional/consequential matrix'. This served to ensure that conditions and consequences which are broad in scope (macro conditions and consequences) as well as those which are relatively narrow in scope (micro conditions and consequences) formed part of the analysis. In cases where micro/macro conditions and consequences intersected or interacted attempts were made to place these in the situational context and linked to the key research themes. Thereby a "systematic, logical, and integrated account" of significant data relationships was specified (Strauss and Corbin 1998, p. 190). The purposes of the matrix are summarised in Table 7.5:

Table 7.5: Purposes of the Conditional/Consequential Matrix

1. To extend the range of conditions and consequences considered for analysis beyond the micro level
2. To help the analyst identify and make choices about which combination of conditional or consequential factors in the data might be relevant to a given situation
3. To trace the web of connections that exist between contextual factors and actions
4. To develop explanatory hypotheses about these relationships that can be verified or modified through further data collection and analysis
5. To organise materials and present a more complete and persuasive explanatory account of the phenomenon under investigation

Source: based on Strauss and Corbin (1998), p. 191.

Interview data were analysed and coded on the basis of the four thematic constructs defining the corporate environmental consciousness model outlined in Table 7.6. The interview themes in Table 7.6 are demonstrably linked to the issues examined in the postal research questionnaire by virtue of the interview themes also constituting the research model constructs. The variables associated with the thematic constructs and the relation between these constructs and questionnaire questions or statements was discussed in Chapter 7.3.

Examination of the 'company culture' construct involved interviewees outlining important features of the company business strategy. Respondents were also invited to suggest why research on business activities and its importance often revealed 'improving environmental activities' not to be an important corporate goal. The implications of these findings were discussed in relation to the notion of sustainable development.

In Chapter 3.2.3 the limitation of environmental consciousness concepts was highlighted which entail analyses of environmental values and attitudes without a research dimension that appropriately defines and contextualises conation. This theme was investigated during interviews through questions examining the relationship between (personal) environmental values or attitudes and corporate practices. Implicit in the postmaterialist thesis (Inglehart 1971, 1977) is a notable correlation between personal and cultural 'shifts' in cognition or conation. Therefore, questions were raised with interviewees designed to examine the relationship between company environmental attitudes and company environmental practices.

The cognitive aspects of corporate environmental consciousness also involve learning processes which imply changes in corporate values and organisational communication (Argyris and Schon 1978, Habermas 1985, Kirsch 1990). Four important discussion points were selected from this consideration. Firstly,

interviewees were prompted to demonstrate knowledge of environmental legislation as well as corporate environmental management defined through the elements of EMAS and ISO 14001. Secondly, interviewees were asked to provide examples of good environmental practices, ideally in the form of an environmental measure for which there was no legal liability, to demonstrate corporate environmental sensitivity. Thirdly, interviewees were invited to comment on difficulties experienced by their company in relation to external or internal environmental communication. Fourthly, interviewees were invited to comment on company environmental training provisions and the impact of these provisions on company environmental performance. Firms were also asked to demonstrate environmental sensitivity by demonstrating how their corporate activities were influenced by environmental principles.

Questions concerning 'corporate environmental engagement' focused on the extent to which EMS elements had been implemented and the broad experiences associated with such implementation. Interviewees were encouraged to express their views on the EMS structure, resource costs and resource gains as a consequence of environmental management. Questions on 'institutionalisation factors' aimed at identifying the impacts of institutionalisation discussed in Chapter Six but not accounted for in the postal questionnaire as a consequence of their often qualitative character. Therefore, interviewees were invited to express views on four issues considered to be important in the investigation of these impacts. The first was the role played by the media in highlighting the link between private and corporate environmental aspects of pollution. The second discussion point concerned the appropriateness of governmental pressure on SMEs to enhance their environmental performance. The third and fourth issues aimed at measuring the quality of existing resource support in relation to good environmental practice and access to environmental knowledge or expertise received by SMEs.

Table 7.6: Themes Governing Interview and Interview Data Analysis

Themes	Research Questionnaire	Interview Discussion Points
Company Culture	Company Goals (Questions 2.1 - 2.4, 4.6)	Discuss the significance of the low priority of 'environmental activities' in surveys listing priority corporate goals. Implications of low priority in relation to the notion of sustainable development. Coupling environmental activities to general and specific corporate goals.
Corporate Environmental Culture	Environmental Concerns (Questions 3.1 - 3.3, 4.1, 4.4, 4.5, 5.2, 5.3, 5.5, 5.7, 5.9)	Establish the extent to which it is felt that personal views/concerns or satisfactions with the state of the physical environment is reflected/informed by company practice under the manager's control and in the company as a whole. Relationship between personal environmental attitudes and practices with company environmental attitudes and practices. Provide examples of how company behaviour is influenced by principles: polluter pays, precautionary; cooperative and voluntary practices and economic instruments. Examples of good environmental practice. Explain why practices or actions were undertaken. Differences between EMAS and ISO 14001. The extent to which environmental measures have been introduced by firm for which there is no legal liability, why were these measures selected. The extent to which firm is familiar with all relevant environmental legislation and issues. The relationship between corporate environmental performance and compulsory or voluntary environmental training. Difficulties in relation to environmental communication and the nature of firm environmental communication.

Table 7.6: Themes Governing Interview and Interview Data Analysis (ctd.)

Themes	Research Questionnaire	Interview Discussion Points
Corporate Environmental Engagement	Environmental Management (Questions 4.2, 4.3, 5.1, 5.4, 5.6, 5.8, 5.10, 5.11, 5.12, 5.13)	The extent to which EMS elements have been employed to address environmental aspects and impacts of firm's practice, and the difficulties associated with the implementation of EMS element(s). Advantages identified in an EMS. Disadvantages identified in an EMS. Resource costs in relation to EMS implementation and resource gains as a consequence of its implementation.
Institutionalisation Factors	Environmental Support (Questions 6.1 - 6.7)	Media role in highlighting environmental aspects of industrial pollution. Extent to which the link between environmental aspects of private and business activities is highlighted. Source of greatest pressures on environmental practice in firm, and how this is expressed. Government expectations of SME environmental performance. Views on current business support for SMEs in relation to environmental good practice. Information and instructional sources for SME environmental support.

7.7.1 Interview Selection

The interview selection process aimed at capturing the widest possible range of company types which had previously responded to the questionnaire. Five broad approaches were considered in this respect. The first possible interview cohort was one which mirrored:

(i) high environmental engagement, typified by firms with a certified or verified EMS;
(ii) median environmental engagement, typified by firms without a certified or verified EMS but which indicated environmental commitment through corporate environmental activities including 'written environmental guidelines', 'workers assigned to environmental tasks and programmes', the existence of an environmental committee, team or other instrument to facilitate environmental knowledge or practice; and
(iii) low environmental engagement, typified by firms without an EMS and without the attributes identified with environmental commitment.

The second approach defined the interview cohorts by company size whilst the third approach defined the interview cohorts by industry sector. The fourth approach defined interview cohorts by region. The fifth interview selection process combined each of the above aspects. The fifth interview selection process was considered to be the best approach since it complimented the quantitative approach guiding initial firm selection for questionnaire respondents. In keeping with the company selection criteria defined in Chapter 7.5 interviews were sought with 20 UK companies and 25 German companies.

Each of the thirty-nine firms interviewed had previously received questionnaires. During the original telephone contact made with these firms the possibility of additional contact through a company interview was raised and company preparedness or unpreparedness recorded for future reference.

The balance between the three levels of environmental engagement, company size, industry sector and region was not fully achieved. In neither UK nor German responding firms was it possible to satisfy all interview selection criteria outlined above. The unavailability of Company Management during the time defined for research interview purposes also reduced company selection options or resulted in the postponement of regional interviews to a date better accommodated by the majority of interviewees. Table 7.7 outlines the employment size, sector and region of the interviewed companies. No company interview was conducted with a company with less than 10 employees and not all industry sectors within the 10-500 company size categories were represented. However, each industry sector included at least one example of firms representing the different levels of environmental engagement.

Table 7.7: Company Interview Profile

UK Firms : E- Eastern, L - London, NW - North West, WM - West Midlands				
Size	**Chem/Rub/Plas**	**Machinery**	**Pulp/Pap/Pack**	**Food/Beverages**
1-9				
10-49		(NW);		
50-99	(NW); (NW);	(WM)	(E);	
100-249	(E);	(L); (L); (WM);		(L); (L);
250+	(E);	(NW);	(E); (NW);	(L);
German Firms : Schl - Schleswig-Holstein, B - Berlin, BW - Baden-Württemberg, NW - Nordrhein-Westfalen				
Size	**Chem/Rub/Plas**	**Machinery**	**Pulp/Pap/Pack**	**Food/Beverages**
1-9				
10-49	(BW);		(BW); (BW); (Schl);	
50-99	(BW);	(BW);	(BW);	(BW);
100-249	(BW); (B); (Sch);		(B); (B); (Sch);	(B); (NRW);
250+	(NRW)	(B); (NRW); (BW);	(NRW);	(NRW); (Schl);

7.7.2 Interviews with Business Support Organisations

Questionnaire analysis and company interview data provided the structure for interviews conducted with a range of business support organisations:

The Environment Agency, *Umweltbundesamt* (German Environmental Federal Agency), Birmingham Chambers of Commerce, Manchester Chambers of Commerce, Confederation of British Industry (CBI), British Chambers of Commerce (BCC), *Bundesverband der Deutschen Industrie* (Federal Association of German

Industry), *Industrie Handelskammer zu Köln* (Chambers of Commerce in Cologne), Department of Trade and Industry (DTI), Business in the Environment and Green Business Club representatives.

The purpose of these interviews was to provide additional perspectives to the investigation of institutional impacts on SME attitude and behaviour discussed in Chapter Six.

7.8 Research Hypotheses

An empirical examination of the corporate environmental consciousness model was conducted through research hypotheses. These hypotheses aim at establishing whether correlations exist between variables and constructs of the research model. The exploration of these correlations is considered to be central to understanding the relationship between corporate environmental values, attitudes and behaviour. The null hypotheses are as follows:

(i) There is not a correlation between corporate goals and country.

(ii) Environmental concern does not correlate with company size.

(iii) There is not a correlation between corporate orientations and corporate environmental attitudes within firms.

(iv) There is not a correlation between environmental values and company size.

(v) There is not a correlation between environmental values and industry sector.

(vi) There is not a correlation between environmental attitudes and company size.

(vii) There is not a correlation between environmental attitudes and industry sector.

(viii) There is not a correlation between environmental values and corporate environmental attitudes.

(ix) There is not a correlation between corporate environmental attitudes and corporate environmental values.

(x) There is not a correlation between industry sector and environmental concern.

(xi) There is not a correlation between industry sector and environmental commitment.

(xii) There is not a correlation between environmental commitment and company size.

(xiii) There is not a correlation between corporate environmental knowledge and company size.

(xiv) There is not a correlation between environmental values and environmental action.

(xv) There is not a correlation between environmental attitudes and environmental action.

(xvi) There is not a correlation between industry sector and environmental action.

(xvii) There is not a correlation between company size and environmental action.

(xviii) There is not a correlation between corporate orientations and environmental action.

(xix) There is not a correlation between institutional factors and country.

The variables and constructs examined in the hypotheses are defined in this research as follows:

'Corporate goals' refer to the defined corporate goals in Questionnaire Section 2.3.

'Corporate orientations' refer to the orientations defined in Question Sections 2.1, 2.2, 2.4 and 5.14.

'Environmental concern' refers to company response to those concerns defined in Questionnaire Section 3.1.

'Environmental attitudes' refer to company response to those issues and institutional influences defined in Questionnaire Sections 3.2, 3.3, 4.4 and 4.5.

'Environmental values' refer to corporate orientations defined in Questionnaire Sections 4.1 and 4.6.

'Environmental commitment' refers to those activities defined in Questionnaire Section 4.3.

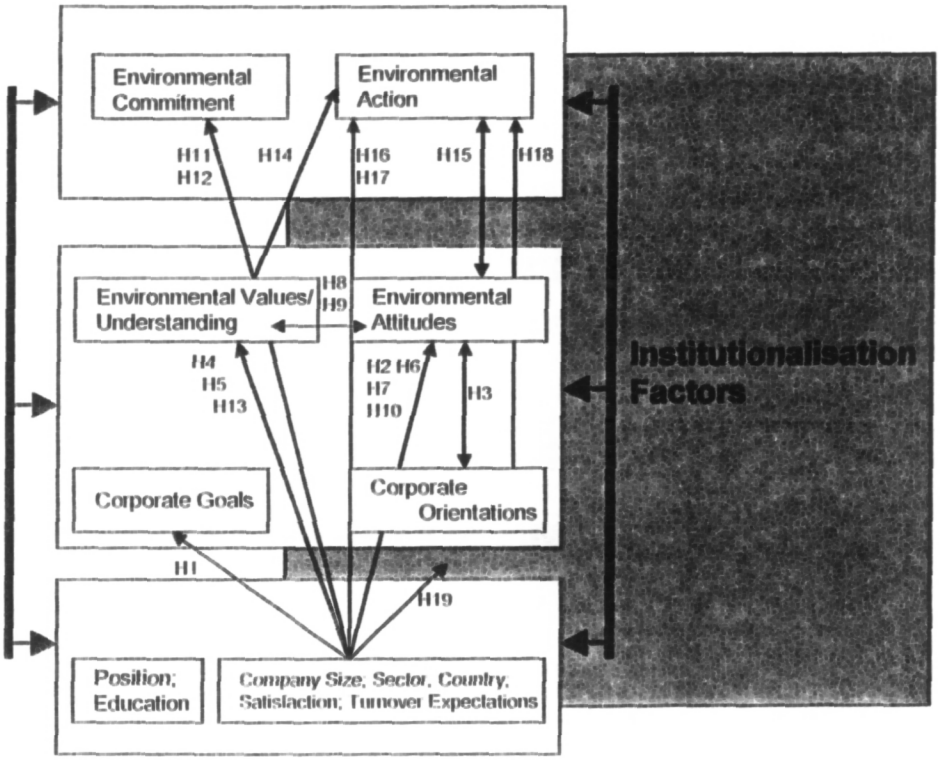
'Environmental knowledge' refers to an understanding of corporate environmental management issues defined in Questionnaire Sections 5.2, 5.3, 5.5, 5.7 and 5.9.

'Environmental action' refers to those activities defined in Questionnaire Sections 4.2, 5.1, 5.6, 5.8, 5.10, 5.11, 5.12 and 5.13.

'Institutionalisation factors' refer to company response to those agencies defined in Questionnaire Sections 6.1, 6.2, 6.3, 6.4, 6.5, 6.6 and 6.7.

These definitions compliment those provided in Chapter 7.3. The hypotheses are graphically represented in Figure 7.2:

Figure 7.2: Research Hypotheses Model



7.9 Research Dataset

7.9.1 Telephone Survey Results

In keeping with the Telephone Survey Data collection method specified in Chapters 7.5 and 7.6 sixty-four (64) micro and small enterprises were introduced to the research process. Survey outcomes are presented in Table 7.8. Table 7.9 indicates the grounds identified by UK and German companies for declining to complete the postal questionnaire. In both UK and German firms the foremost reason was described as an absence of time followed by a disinterest in the pursuit of environmental themes beyond existing company levels.

Table 7.8: Telephone Survey Response

Company Response	UK	Germany
Size		
1-9	32 (25%)	32 (25%)
10-49	32 (25%)	32 (25%)
Total	64 (50%)	64 (50%)

Source: Telephone Survey (1998)

Over half of the participants expressed concern that three of the telephone survey questions posed required more time to adequately answer than the constraints of the telephone call allowed for and as a consequence failed to answer these questions. Company responses to the remaining seven questions are presented alongside complimentary data results of the postal questionnaire.

Table 7.9: Telephone Survey Response - Grounds for Refusal

Company Response	UK (%)	Germany(%)
Not Interested	22 (34.3%)	28 (43.7%)
No Time	49 (76.5%)	52 (81.2%)
We Do Not Fill In Questionnaires	9 (14.0%)	24 (37.5%)
Environmental/Manager Unavailable	12 (18.7%)	15 (23.4%)
Company Size (1-9)		
Not Interested	59.3	62.5
No Time	90.6	84.3
We Do Not Fill In Questionnaires	18.7	65.6
Environmental/Manager Unavailable	9.3	18.7
Company Size (10-49)		
Not Interested	40.6	25.0
No Time	62.5	68.7
We Do Not Fill In Questionnaires	9.3	9.3
Environmental/Manager Unavailable	28.1	28.1
Sector (Chemicals, Rubber and Plastic)		
Not Interested	31.8	28.5
No Time	75.0	75.0
We Do Not Fill In Questionnaires	6.2	31.2
Environmental/Manager Unavailable	31.2	31.2
Sector (Machinery)		
Not Interested	22.7	25.5
No Time	37.5	68.7
We Do Not Fill In Questionnaires	31.2	50.0
Environmental/Manager Unavailable	12.5	31.2
Sector (Pulp, Paper, Packaging)		
Not Interested	36.3	32.1
No Time	87.5	81.2
We Do Not Fill In Questionnaires	18.7	31.2
Environmental/Manager Unavailable	31.2	18.7
Sector (Food and Beverages)		
Not Interested	9.0	14.2
No Time	87.5	100.0
We Do Not Fill In Questionnaires	0.0	37.5
Environmental/Manager Unavailable	0.0	12.5

7.9.2 Postal Questionnaire

7.9.2.1 Personal and Company Details

As previously defined in Chapter 7.5 seven hundred and twenty (720) questionnaires were sent out to contacted companies. Of these 302 questionnaires were returned, representing a return rate of 42%. The number of questionnaires returned which could be evaluated for research purposes amounted to 282, yielding a questionnaire response rate of 39%.

Figure 7.3 indicates the percentage breakdown of the total company response based on industry sector. The highest returns were received from the Machinery sector (34.4%), followed by the Chemicals, Rubber and Plastic industry sectors (27%), with the Food and Beverages (19.5%) and Packaging sectors (19%) recording similar response rates.

Figure 7.3: Total Company Responses - Industry Sectors

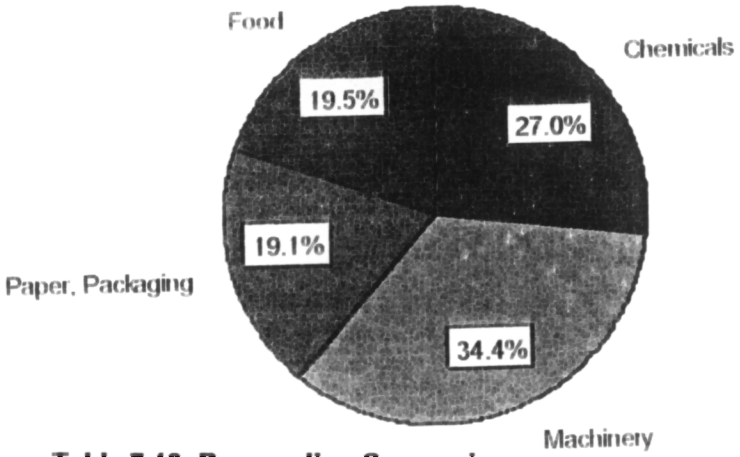


Table 7.10: Responding Companies

Sector	Number
Chemicals, Rubber and Plastic	76
Machinery	97
Pulp, Paper and Packaging	54
Food	55
Total	**282**

Table 7.10 outlines the company responses based on country. Questionnaires were received from 110 UK companies, whilst 172 questionnaires were returned by German companies. This represents a 34% return rate on the part of UK companies and a 43% return rate on the part of German companies. On the basis

of the strategies adopted to secure a higher rate of return, the German company response was in line with anticipated results. In both the UK and German cases the relatively high return rates can be directly attributed to the interest of the companies in the nature of conducted research in addition to the personal contacts the author made with the company representatives.

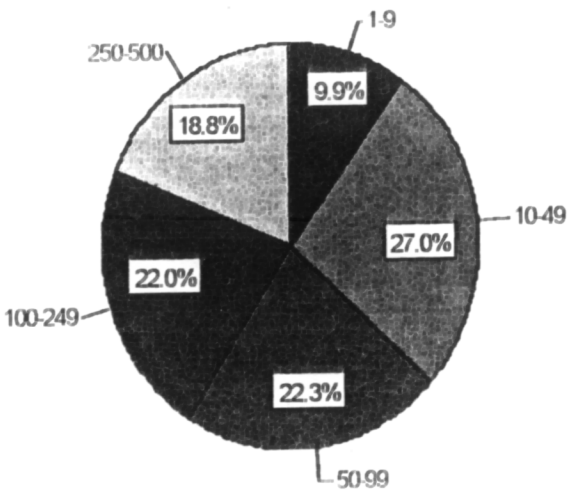
The country distributions defined by sector were fairly similar. In both the UK and Germany the Machinery sector recorded the highest percentages, followed by the Chemicals, Rubber and Plastic sectors. In Table 7.11 the UK the Packaging sectors recorded the third highest percentage followed by the Food and Beverages sector:

Table 7.11: Company Response (Industry Sector)

UK Company Response		German Company Response	
Chem/Rub/Plas	32 (29%)	Chem/Rub/Plas	44 (26%)
Machinery	37 (34%)	Machinery	60 (35%)
Pulp/Paper/Pack	21 (19%)	Pulp/Paper/Pack	33 (19%)
Food/Beverages	20 (18%)	Food/Beverages	35 (20%)
Total	110 (100%)	Total	172 (100%)

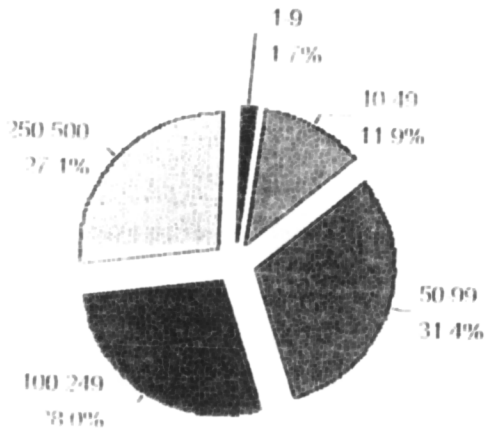
Figure 7.4 reveals the response distribution based on company size. Overall the highest number of questionnaires were received by companies with between 10 - 49 employees (27%), followed by the 50-99 company category (22.3%), 100-249 category (22%), 250-500 category (18 8%) and the 1-9% company size category (9.9%).

Figure 7.4: Total Company Response based on Company Size



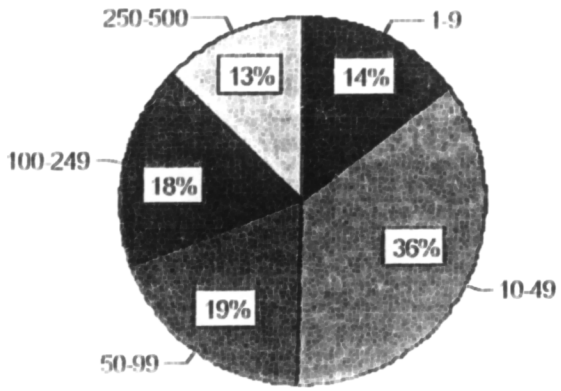
Figures 7.5 and 7 6 revealed significant differences in company response rates based on company size from the UK and Germany The 1-9 company category represented 2% of all UK questionnaire responses, followed by the 10-49 company size category (13%), the 250-500 category whilst the 50-99 and 100-249 company size groups recorded 29% of all UK questionnaire returns. Consequently comparative analysis at the company size category 1-9 was not possible between UK and German responding firms.

Figure 7.5: UK Company Response rate based on Company Size



The German response rate, as indicated in Figure 7.6, was more evenly represented by all company category sizes. The smallest percentage return was received from the 250-500 company size category (13%), followed by the 1-9 company size group (14%). Responses from the German 100-249 recorded a return rate of 18%, the 50-99 company category recorded a return rate of 19%, whilst the 10-49 category registered the highest rate of both countries (36%).

Figure 7.6: German Company Response rate based on Company Size



7.9.2.1.1 Position in Organisation

Questionnaires were sent out to companies after contact had been primarily made with a Company Director, who either completed and returned the questionnaire or directed the questionnaire to the firm's environmental spokesperson. In cases where initial firm contact was secured with an Environmental Representative or Manager an agreement was reached whereby the questionnaire would be completed by a company representative best able to voice the corporate management ideals of the firm. Subsequently the largest percentage of questionnaire respondents were Company Directors and Managers as indicated by Figure 7.7 below. Although more Company Directors in the UK and Germany returned questionnaires than other company personnel there were notable differences between the distribution of UK and German personnel responses as highlighted in Figures 7.8 and 7.9. The questionnaire return rate in the UK was more evenly spread between Company Directors (30%), Environmental Managers (22%) and Departmental Managers (21%). In contrast German Company Directors (59%) represented a larger percentage than the collective total of all of respondents. Other respondents were Environmental Managers (12%) and Departmental Managers (11%). Since similar numbers of Company Directors were contacted in both countries and were able to decide which member of staff

completed the questionnaire, the difference in personnel response rates can be considered to reflect the importance of environmental themes in the German workplace from the perspective of Company Directors. This claim is to a large extent substantiated by research results considered later in Chapter Eight. Company responses were indicative of company interest in the environmental management issues raised by this research and a willingness to commit time to these concerns. Initial company telephone contact to establish whether there was sufficient interest in the research topic to secure the completion of questionnaires can be described as a useful method of uniformly locating the environmental protagonist or environmental voice within responding UK and German firms.

Figure 7.7: Position in Company of all Respondents

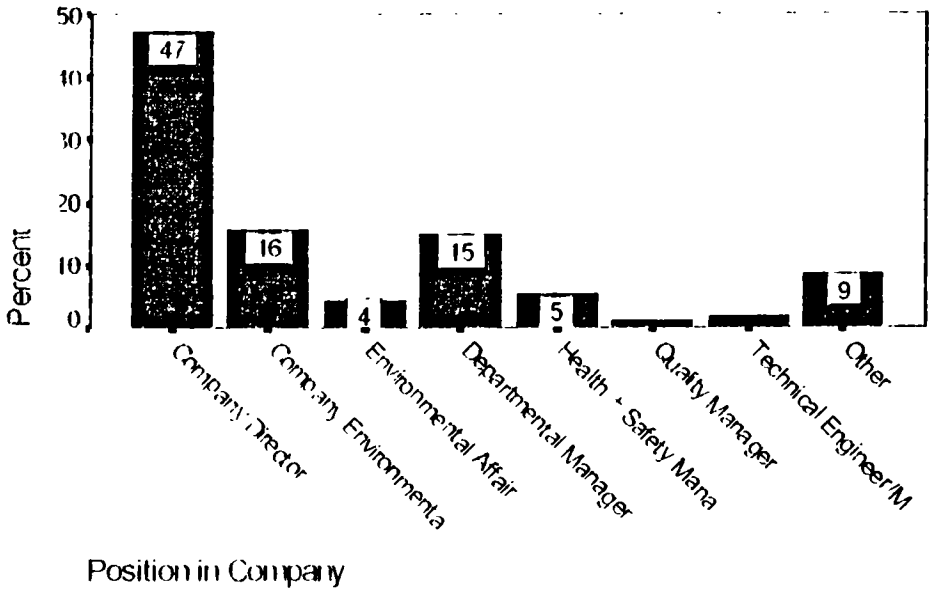


Figure 7.8: Company Position of UK Respondents

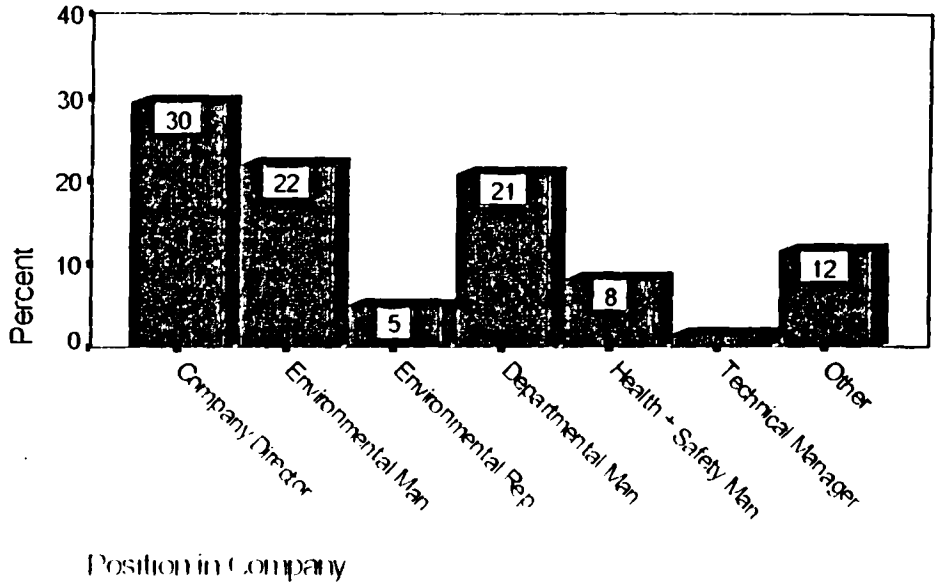
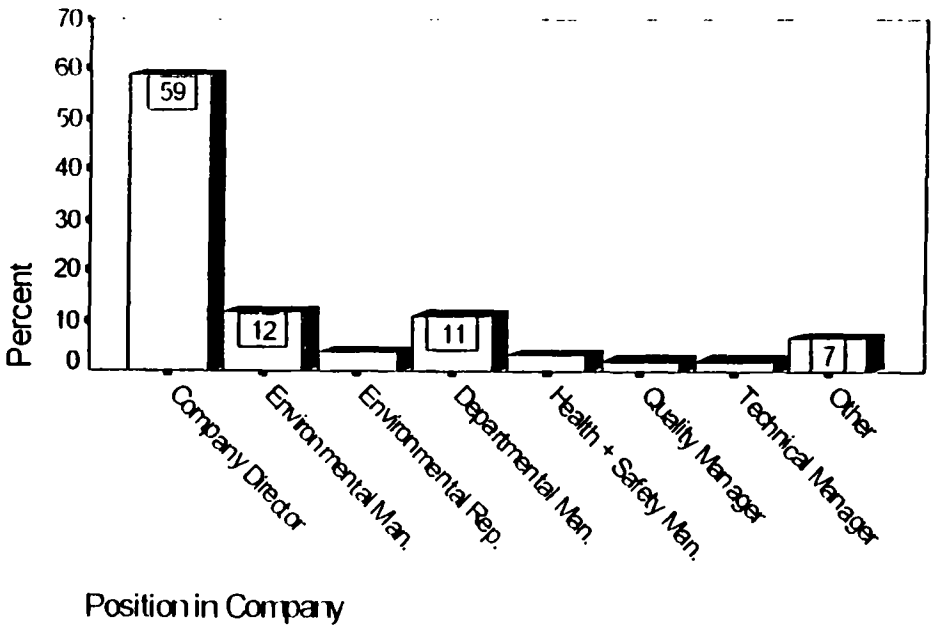


Figure 7.9: Company Position of German Respondents



7.9.2.1.2 Education Level of Respondents

The education attainment levels of UK and German respondents were similar as indicated in Figures 7.10 and 7.11. The largest percentage of respondents had received university level education (UK 43%, Germany 49%). A GCSE or *Mittlere Reife* standard education was achieved by the second largest group in the UK (27%) and Germany (28%), whilst the third highest percentage response were recorded for respondents with an A-level or *Abitur* standard education. Percentage rates for other forms of education were not high enough to enable meaningful analysis.

Figure 7.10: UK Respondent Education Level

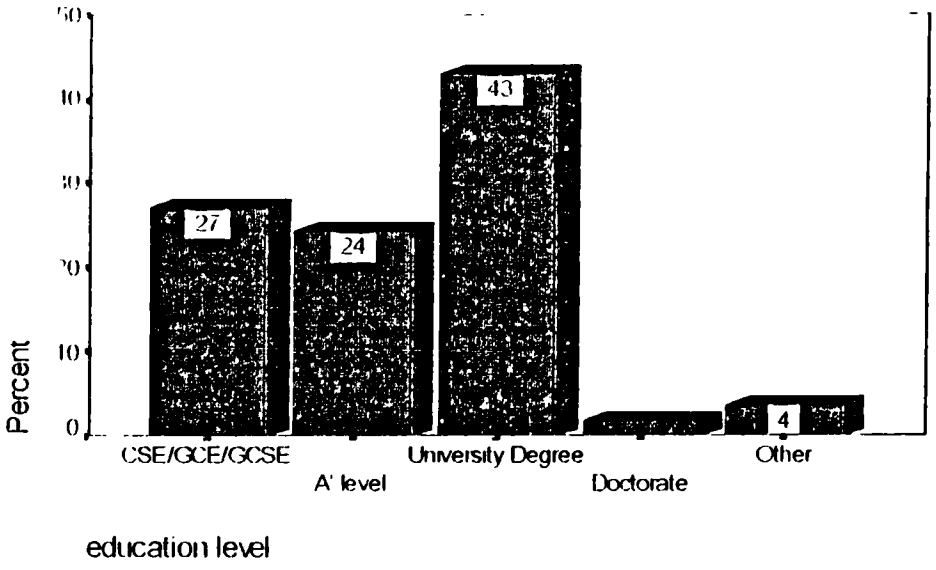
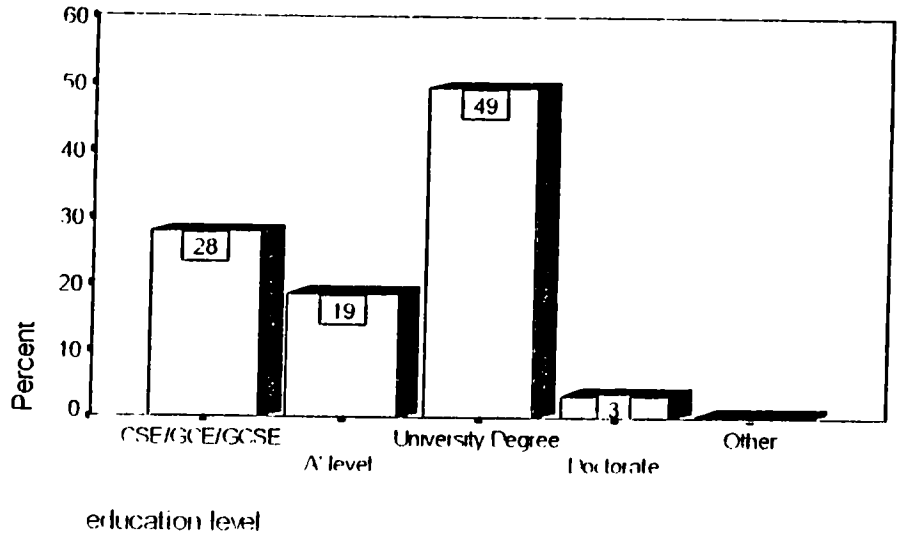


Figure 7.11: German Respondent Education Level

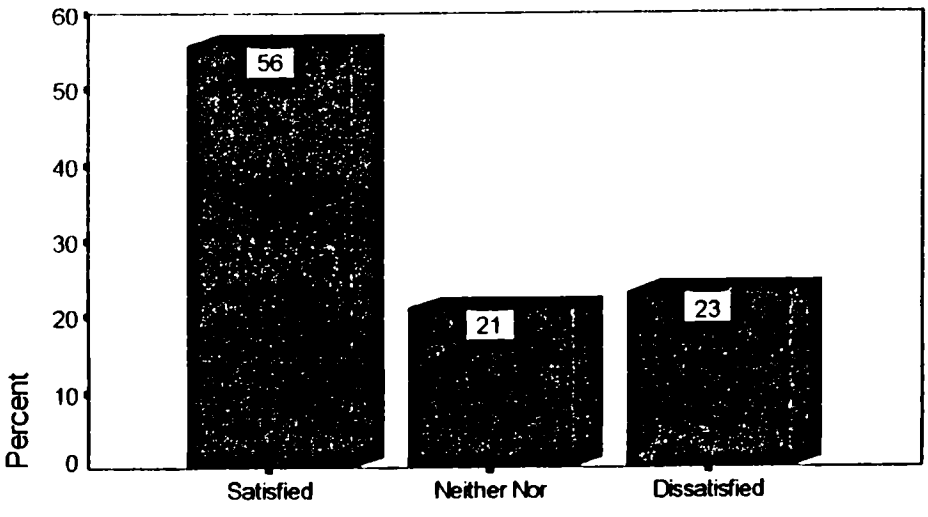


7.9.2.2 Corporate Management

7.9.2.2.1 Company Performance

The majority of companies were satisfied with their company's performance during the last business year as indicated by Figure 7.12. The levels of company performance satisfaction were similar. The majority of UK and German respondents were satisfied with their company performance (UK 59%, Germany 54%). An even spread of companies were dissatisfied with the performance of their companies (UK 25%, Germany 23%), whilst a lower percentage of UK respondents voiced neither satisfaction nor dissatisfaction with the performance of their firms (UK 16%, Germany 23%).

Figure 7.12: Performance Satisfaction of Responding Companies



High levels of satisfaction were expressed by the majority of telephone surveyed micro and small enterprises in relation to existing corporate environmental performance as indicated in Table 7.12:

Table 7.12: Telephone Survey Response - Environmental Satisfaction

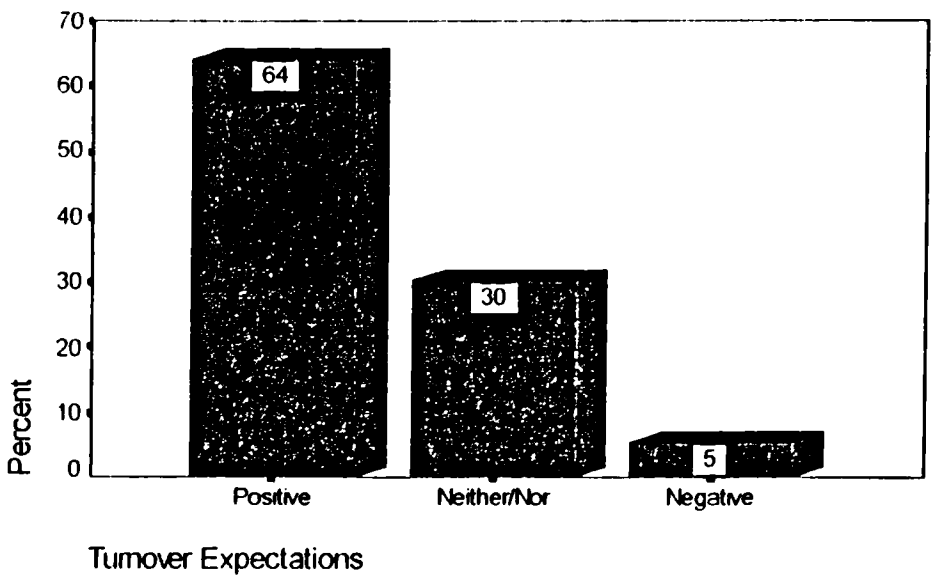
Are you Satisfied with the Environmental Performance of your Company?	UK (%)	Germany (%)
Yes	93.7	90.6
1-9	96.8	93.7
10-49	90.6	87.5

Source: Telephone Survey (1999)

7.9.2.2.2 Company Expectations

The majority of companies returning questionnaires had a positive outlook regarding future company turnover expectations as indicated by Figure 7.13. This positive stance was replicated on a country level (UK 66%, Germany 63%). Less than 10% of all respondents anticipated a poor turnover performance in the following three years (UK 7%, Germany 4%), whilst no more than a third of respondents from the UK and Germany were undecided about future turnover developments of their firms (UK 27%, Germany 33%). The result categories ('Positive', 'Negative', 'Agree' and 'Disagree', 'Important' and 'Unimportant', etc) have been calculated through aggregates of numbers 1 and 2 of the response categorisations and numbers 4 and 5 of the response categorisations in the Likert scales used in the Research Questionnaire, unless otherwise stated.

Figure 7.13: Company Responses in relation to Future Turnover Expectations



8 HYPOTHESES TESTING AND DATA ANALYSIS

In Chapter Eight the null hypotheses examining the corporate environmental consciousness model are tested and discussion of the research results is conducted through the constructs defining this model. These were described in Chapter 7.1 as company culture, corporate environmental culture, corporate environmental engagement and institutionalisation factors. Research analysis combines qualitative data and company studies drawn from SME interviews with quantitative data derived from the research dataset presented in Chapter 7.9. Reference to related themes considered in previous Chapters serves to contextualise research analysis. Excerpts from discussions between the author and German interviewees were also translated by the author.

8.1 Hypotheses Testing

Overall, the five most important competitive goals for UK respondents were identified as 'Reducing Costs' (58.2%), generally improving 'Company Competitiveness' (52.7%), 'Promoting Marketing/Sales' (38.2%), 'Improving Company Culture/Communication' (28.2%) and 'Investing in Production Technology (24.5%). 'Strengthening Environmental Activities' and 'Intensifying Research/Development of Activities' were the least important of all listed independent competitive pursuits in UK firms. The most important corporate goals for the German respondents were 'Improving Marketing/Sales' (59.2%), followed by 'Reducing Costs' (50.0%) and general improvements in 'Company Competitiveness' (39.5%). In contrast to the UK respondents, German respondents considered 'Product innovation' to be the fourth most important corporate goal (33.1%), followed by investing in 'Production Technology' (23.3%). The corporate goals of UK and German firms were analysed on the basis of company performance satisfaction and turnover expectation levels. Companies with positive turnover expectations represented the majority of companies which replied to the questionnaire (Figure 7.13) so perhaps not surprisingly the corporate aspirations of UK and German firms presented above are largely reproduced in the

analysis of company performance satisfaction and turnover levels in Table 8.1 (Positive Turnover Expectations: Promotion of Marketing - χ^2, r = 10.83, df = 1, p = 0.0009; Improvement of Company Culture - χ^2, r = 4.96, df = 1, p = 0.02; Improving Company Competitiveness - χ^2, r = 5.34, df = 1, p = 0.02; Promoting Product Innovation - χ^2, r = 11.32, df = 1, p = 0.0007). SMEs with median turnover expectations in the UK and Germany largely shared similar characteristics or corporate goals were not statistically significant. Negative turnover expectations in companies tended to polarise company focus in areas perceived to be key to company survival. Both UK and German SMEs tended to concentrate on cost reduction strategies (Negative Turnover Expectations: Table 8.1: UK 87.5%, Germany 100.0%). Other areas of focus can be identified with the predominant aspirations of UK and German SMEs with positive turnover expectations; UK companies maintained the interest in market diversification whilst German SMEs more intensively pursued company promotion marketing strategies. Investment in production technology was not a concern for such UK companies. Neither research development nor corporate environmental improvement strategies, the sustained quality of which is dependent upon effective research and development, were likely to be employed by UK or German SMEs anticipating negative turnovers. Corporate goal evaluations of UK and German companies assessed on the basis of company performance produced similar response rates with the exception of German firm attitude towards promoting corporate marketing, which was more likely to be pursued by German companies dissatisfied with their company performance than corresponding UK companies.

Tables 8.1 and 8.2 also indicate that German companies with positive turnover expectations were more inclined than UK companies to adopt strategies which promoted the marketing of company image to generate sales, whilst German companies with negative turnover expectations or company performance were more inclined to pursue cost reducing strategies. UK companies with positive turnover expectations and high company performance satisfaction were more

inclined than German companies to focus on cost reduction measures; UK companies with negative turnover expectations and low company performance satisfaction maintained or heightened cost reduction strategies in addition to improving general company competitiveness. Marginally more UK companies with negative corporate goals and low performance satisfaction felt that greater emphasis on product innovation would be advisable than UK firms with positive turnover expectations or high performance satisfaction. This contrasted with German companies which recorded significantly lower levels of interest in product innovation during states of performance dissatisfaction and low turnover expectations. For both UK and German firms there was a general weakening of emphasis on strengthening environmental activities during states characterised by limited economic success. These conclusions are supported by Tables 8.3 and 8.4 which examined the motivation behind important environmental investments of UK and German firms. During the states of positive, neutral and negative turnover expectations and company performance, company environmental investments were primarily motivated by cost reductions and minimising risk liability. More German firms consciously associated environmental investments with image and marketing considerations than UK firms throughout the company performance categories and consistently identified modifying all company practices to account for environmental and ecological impacts as an important investment in itself (Table 8.4, 'Total 'Greening' of Company'). These patterns were largely repeated in the examination of UK and German environmental investment considerations throughout the turnover expectation categories (Table 8.3), where environmental investment decisions were more closely associated with cost reduction and liability risk minimisation rationales than any other factors, with comparatively fewer UK firms engaging in environmental investments as a consequence of image, marketing or ecological considerations.

Table 8.1: Corporate Goal Evaluation of UK and German Firms (Turnover Expectations)

SME Turnover Expectations		
Positive	**UK %**	**Germany%**
Diversification of Market	18.1	7.3
Promotion of Marketing/Sales	40.3	65.1
Investment in Production Technology	29.2	27.5
Improvement of Company Culture/Communication	30.6	16.5
Reducing Costs	56.9	38.5
Improvement of Motivation/ Qualification of Staff	20.8	22.9
Upgrading IT	11.1	13.8
Further Improvement of Quality Assurance	13.9	21.1
Intensifying Research / Development of Activities	6.9	11.0
Improving Company Competitiveness	47.2	30.3
Strengthening Environmental Activities	9.7	7.3
Promoting Product Innovation	15.3	38.5
Neither Positive Nor Negative		
Corporate Goals	**UK %**	**Germany%**
Diversification of Market	20.7	8.9
Promotion of Marketing/Sales	37.9	46.4
Investment in Production Technology	20.7	16.1
Improvement of Company Culture/Communication	27.6	17.9
Reducing Costs	55.2	66.1
Improvement of Motivation/ Qualification of Staff	17.2	19.6
Upgrading IT	13.8	23.2
Further Improvement of Quality Assurance	3.4	14.3
Intensifying Research / Development of Activities	10.7	3.6
Improving Company Competitiveness	58.6	57.1
Strengthening Environmental Activities	10.3	1.8
Promoting Product Innovation	13.8	25.0
Negative		
Corporate Goals	**UK %**	**Germany%**
Diversification of Market	25.0	0.0
Promotion of Marketing/Sales	12.5	71.4
Investment in Production Technology	0.0	14.3
Improvement of Company Culture/Communication	12.5	0.0
Reducing Costs	87.5	100.0
Improvement of Motivation/ Qualification of Staff	25.0	28.6
Upgrading IT	12.5	14.3
Further Improvement of Quality Assurance	12.5	14.3
Intensifying Research / Development of Activities	0.0	0.0
Improving Company Competitiveness	87.5	42.9
Strengthening Environmental Activities	0.0	0.0
Promoting Product Innovation	25.0	14.3

Table 8.2: Corporate Goal Evaluation of UK and German Firms (Company Performance Satisfaction)

SME Company Performance Satisfaction		
Satisfied	**UK %**	**Germany%**
Diversification of Market	14.1	9.7
Promotion of Marketing/Sales	40.6	35.9
Investment in Production Technology	34.4	26.9
Improvement of Company Culture/Communication	25.0	18.3
Reducing Costs	62.5	37.6
Improvement of Motivation/ Qualification of Staff	17.2	20.4
Upgrading IT	12.5	17.2
Further Improvement of Quality Assurance	14.1	17.2
Intensifying Research / Development of Activities	6.3	10.8
Improving Company Competitiveness	46.9	39.8
Strengthening Environmental Activities	12.5	7.5
Promoting Product Innovation	14.1	38.7
Neither Positive Nor Negative		
Corporate Goals	**UK %**	**Germany%**
Diversification of Market	33.3	7.3
Promotion of Marketing/Sales	27.8	51.2
Investment in Production Technology	0.0	14.6
Improvement of Company Culture/Communication	33.3	12.2
Reducing Costs	55.6	56.1
Improvement of Motivation/ Qualification of Staff	22.2	29.3
Upgrading IT	16.7	24.4
Further Improvement of Quality Assurance	5.6	29.3
Intensifying Research / Development of Activities	17.6	4.9
Improving Company Competitiveness	53.6	31.7
Strengthening Environmental Activities	0.0	2.4
Promoting Product Innovation	16.7	36.6
Dissatisfied		
Corporate Goals	**UK %**	**Germany%**
Diversification of Market	22.2	2.6
Promotion of Marketing/Sales	37.0	76.3
Investment in Production Technology	18.5	23.7
Improvement of Company Culture/Communication	33.3	15.8
Reducing Costs	57.9	73.7
Improvement of Motivation/ Qualification of Staff	25.9	18.4
Upgrading IT	7.4	7.9
Further Improvement of Quality Assurance	7.4	10.5
Intensifying Research / Development of Activities	3.7	5.3
Improving Company Competitiveness	66.7	47.4
Strengthening Environmental Activities	7.4	2.6
Promoting Product Innovation	18.5	15.8

Table 8.3: Important Environmental Investments of UK and German Firms (Turnover Expectations)

Important Corporate Targets (Positive)	**UK %**	**Germany%**
Reduction of Costs	52.8	48.6
Minimizing Liability Risks	44.4	41.3
Image and Marketing Considerations	15.3	32.1
Total 'greening' of the Company	8.3	20.2
Gaining Competitive Advantage	26.4	33.0
Winning new Customers	27.8	23.9
Other (Upholding Authority Standards)	36.1	28.4
None	6.9	2.8
Important Corporate Targets (Neither/Nor)	**UK %**	**Germany%**
Reduction of Costs	48.3	42.9
Minimizing Liability Risks	51.7	37.5
Image and Marketing Considerations	20.7	17.9
Total 'greening' of the Company	0.0	16.1
Gaining Competitive Advantage	10.3	19.6
Winning new Customers	10.3	16.1
Other (Upholding Authority Standards)	44.8	35.7
None	6.9	8.9
Important Corporate Targets (Negative)	**UK %**	**Germany%**
Reduction of Costs	75.0	57.1
Minimizing Liability Risks	62.5	57.1
Image and Marketing Considerations	12.5	14.3
Total 'greening' of the Company	0.0	14.3
Gaining Competitive Advantage	12.5	0.0
Winning new Customers	37.5	28.6
Other (Upholding Authority Standards)	25.6	28.6
None	0.0	14.3

Table 8.4: Important Environmental Investments of UK and German Firms (Company Performance Satisfaction)

Important Corporate Targets (Positive)	**UK %**	**Germany%**
Reduction of Costs	48.4	45.2
Minimizing Liability Risks	48.4	38.7
Image and Marketing Considerations	17.2	30.1
Total 'greening' of the Company	6.3	19.4
Gaining Competitive Advantage	21.9	28.0
Winning new Customers	20.3	23.7
Other (Upholding Authority Standards)	42.2	29.0
None	4.7	4.3
Important Corporate Targets (Neither/Nor)	**UK %**	**Germany%**
Reduction of Costs	61.1	46.3
Minimizing Liability Risks	55.6	46.3
Image and Marketing Considerations	16.7	24.4
Total 'greening' of the Company	5.6	17.1
Gaining Competitive Advantage	27.8	29.3
Winning new Customers	44.4	17.1
Other (Upholding Authority Standards)	33.3	34.1
None	5.6	4.9
Important Corporate Targets (Negative)	**UK %**	**Germany%**
Reduction of Costs	59.3	52.6
Minimizing Liability Risks	40.7	39.5
Image and Marketing Considerations	14.8	21.1
Total 'greening' of the Company	3.7	18.4
Gaining Competitive Advantage	14.8	23.7
Winning new Customers	18.5	21.1
Other (Upholding Authority Standards)	29.6	31.6
None	11.1	7.9

On the basis of the questionnaire responses of UK and German firms Hypothesis One 'There is not a correlation between corporate goals and country' can be rejected. Although UK and German responding firms share many similar views in terms of the priorities apportioned to corporate goals it can be argued that these commonalities are the consequence of practices and 'rules' peculiar to business enterprise and competition within modern market economies. This commonality was illustrated through UK and German priorities in relation to investment in production technology, reduction of costs, improving the motivation and qualification of personnel, intensifying research and strengthening environmental activities. Overall, however, there were significant differences in the emphases placed by UK responding firms on market diversification (χ^2, r = 9.55, df = 1, p = 0.002) and improving company culture and communication (χ^2, r = 5.74, df = 1, p = 0.01). In contrast German firms placed greater emphasis on company marketing (χ^2, r = 11.97, df = 1, p = 0.0005) and promoting product innovation (χ^2, r = 10.84, df = 1, p = 0.009).

In Table 8.5 the environmental attitudes exhibited by UK and German firms are recorded. Statistically significant differences can be identified between UK and German firms, including responses to the prioritisation of employment and environmental concerns, the effects of modern technology and the role played by the media in the dissemination of environmental knowledge. However, response rates in Table 8.5 in relation to these issues were supportive of Hypothesis Two 'Environmental concern does not correlate with company size'. Percentage levels of concern were not demonstrably linked to company size categories. Indirect environmental concern expressed through statements such as 'long-term economic success is not imaginable without considering ecological demands' in Table 8.5 also failed to exhibit clear correlations between environmental concern and company size.

Table 8.5: Response of UK and German Firms Towards Statements in Relation to the Physical Environment (Company Size)

Company Size: 10-49	UK %		Germany %	
Agree?	**Yes**	**No**	**Yes**	**No**
Worries about secure employment are more pressing than thoughts concerning the future of the environment	50.0	21.4	46.8	19.4
Preoccupation with environmental protection increases cost pressures within firms which unavoidably result in job losses	64.3	14.3	35.5	45.2
Technological invention will solve pollution problems	42.9	42.9	62.9	19.4
Ecologically-insensitive management practice within firms will endanger the survival prospects of such firms in the foreseeable future	50.0	21.4	64.5	14.5
The increasing cost of environmental protection negatively impacts our standard of living and by extension the health of the national economy	28.6	35.7	33.9	45.2
The 'media' exaggerate the scale of environmental problems we face	50.0	42.9	30.6	40.3
We live in a society in which the negative side of progress increasingly determines the nature of debates concerning the environment	92.9	0.0	48.4	8.1
All employees should be taught about environmental protection as part of their occupational training	78.6	0.0	83.9	0.0
Continuous exploitation of nature causes irretrievable damage to the natural resources, upon which all societies are dependent	71.4	14.3	77.4	3.2
The effects of modern technology are predominantly positive	50.0	28.6	80.6	4.8
Company Size 50-99	**UK %**		**Germany %**	
Agree?	**Yes**	**No**	**Yes**	**No**
Worries about secure employment are more pressing than thoughts concerning the future of the environment	65.6	12.5	36.4	19.4
Preoccupation with environmental protection increases cost pressures within firms which unavoidably result in job losses	31.3	50.0	32.3	32.3
Technological invention will solve pollution problems	37.5	46.5	45.2	35.5
Ecologically-insensitive management practice within firms will endanger the survival prospects of such firms in the foreseeable future	59.4	15.6	45.2	16.1
The increasing cost of environmental protection negatively impacts our standard of living and by extension the health of the national economy	15.6	50.0	22.6	51.6
The 'media' exaggerate the scale of environmental problems we face	37.5	31.3	19.4	48.4
We live in a society in which the negative side of progress increasingly determines the nature of debates concerning the environment	59.4	9.4	51.6	25.8
All employees should be taught about environmental protection as part of their occupational training	87.5	6.3	77.4	6.5
Continuous exploitation of nature causes irretrievable damage to the natural resources, upon which all societies are dependent	65.6	21.9	71.0	0.0
The effects of modern technology are predominantly positive	34.4	15.6	58.1	0.0

Table 8.5: Response of UK and German Firms Towards Statements in Relation to the Physical Environment (Company Size) (ctd.)

Company Size: 100-249	UK %		Germany %	
Agree?	**Yes**	**No**	**Yes**	**No**
Worries about secure employment are more pressing than thoughts concerning the future of the environment	65.6	12.5	40.0	16.7
Preoccupation with environmental protection increases cost pressures within firms which unavoidably result in job losses	15.6	82.5	20.0	46.7
Technological invention will solve pollution problems	34.4	43.8	60.0	23.3
Ecologically-insensitive management practice within firms will endanger the survival prospects of such firms in the foreseeable future	68.8	12.5	76.7	13.3
The increasing cost of environmental protection negatively impacts our standard of living and by extension the health of the national economy	28.1	50.0	20.0	50.0
The 'media' exaggerate the scale of environmental problems we face	31.3	50.0	26.7	40.0
We live in a society in which the negative side of progress increasingly determines the nature of debates concerning the environment	62.5	9.4	46.7	6.7
All employees should be taught about environmental protection as part of their occupational training	87.5	3.1	90.0	6.7
Continuous exploitation of nature causes irretrievable damage to the natural resources, upon which all societies are dependent	71.9	12.5	63.3	13.3
The effects of modern technology are predominantly positive	43.8	28.1	76.7	3.3
Company Size: 250-500	**UK %**		**Germany %**	
Agree?	**Yes**	**No**	**Yes**	**No**
Worries about secure employment are more pressing than thoughts concerning the future of the environment	50.0	33.3	39.1	30.4
Preoccupation with environmental protection increases cost pressures within firms which unavoidably result in job losses	23.3	63.3	13.0	65.2
Technological invention will solve pollution problems	23.3	36.7	52.2	26.1
Ecologically-insensitive management practice within firms will endanger the survival prospects of such firms in the foreseeable future	63.3	13.3	82.6	8.7
The increasing cost of environmental protection negatively impacts our standard of living and by extension the health of the national economy	10.0	73.3	26.1	52.2
The 'media' exaggerate the scale of environmental problems we face	36.7	56.7	21.7	30.4
We live in a society in which the negative side of progress increasingly determines the nature of debates concerning the environment	50.0	13.3	39.1	30.4
All employees should be taught about environmental protection as part of their occupational training	86.7	6.7	100.	0.0
Continuous exploitation of nature causes irretrievable damage to the natural resources, upon which all societies are dependent	83.3	6.7	65.2	13.0
The effects of modern technology are predominantly positive	53.3	6.7	73.9	13.0

Hypothesis Three 'There is not a correlation between corporate orientations and corporate environmental attitudes within firms' should be rejected. Table 8.4 indicated that although there was broad similarity in the emphases of UK and German corporate orientations, distinct patterns could be identified within these cohorts. In Table 8.6 corporate orientations were examined in relation with responses of UK and German firms to statements regarding environmental practice and its implementation. A statistically significant number of UK firms which had introduced environmental investments in order to win new customers held the view that safeguarding jobs and economic success is of paramount importance (Table 8.6: UK - $p = 0.03$; Germany - $p = 0.08$). More statistically significant correlations were recorded amongst German firms which had introduced environmental investments in order to minimize liability risks and on the basis of image and marketing considerations. German firms in the aforementioned minimizing liability risks cohort agreed with the statement 'thorough corporate environmental management is necessary in the face of increased liability risks (Table 8.6: Germany - $p = 0.001$; UK - $p = 0.56$), 'legislative pressure has prompted stricter environmental controls within companies' (Table 8.6: Germany - $p = 0.03$; UK - $p = 0.26$) but also expressed the view that German laws and environmental prohibitions have reached the limit of their effectiveness (Table 8.6: Germany - $p = 0.04$; UK - $p = 0.73$). The German cohort which introduced environmental protection measures on the basis of image and marketing considerations also claimed qualified staff were attracted to their firms in view of ecologically responsible production methods employed by such firms (Table 8.6: Germany - $p = 0.003$; UK - $p = 0.55$) but disagreed with the view that 'German environmental standards are too high and if this trend continues firms will lose their ability to compete' (Table 8.6: Germany - $p = 0.01$). The corresponding UK cohort, albeit not statistically significant, was in agreement with these sentiments.

Shared instances of statistical significance between UK and German firms were identified in Table 8.7, which examined corporate orientations in the context of

anticipated EMS implementation problems and anticipated advantages accrued through EMS implementation. A statistically significant number of UK and German firms which identified 'reduction of costs' as an important factor in their environmental investment strategy anticipated conflicts with other business systems when implementing an EMS (Table 8.7: UK - p = 0.03; Germany - p = 0.005). A statistically significant number of this German cohort also felt sufficient support from without the company would not be forthcoming (Table 8.7: Germany - p = 0.01; UK - p = 0.07) and problems envisaged organising personnel (Table 8.7: Germany - p = 0.02; UK - p = 0.85). The UK cohort anticipated extra work for staff (UK - p = 0.02; Germany - p = 0.14), inconvenience in the face of additional responsibilities (UK - p = 0.03; Germany - p = 0.29) and problems accessing environmental information and training (UK - p = 0.008; Germany - p = 0.95). A statistically significant number of UK and German firms which associated environmental investments with 'competitive advantage' claimed that EMS implementation would constitute an inconvenience in the face of other responsibilities (Table 8.7: UK - p = 0.04; Germany - p = 0.05). German companies which considered extensive 'greening' or *Ökologisierung* of company practices as an important investment identified EMS implementation to be a source of extra work for staff (Table 8.7: Germany - p = 0.03) and increases in company costs (Table 8.7: Germany - p = 0.0001). A statistically significant number of UK and German firms which identified 'reduction of costs' as an important factor in their environmental investment strategy anticipated cost savings resulting from EMS implementation (Table 8.7: UK - p = 0.00001; Germany - p = 0.00001). A significant number of German firms which introduced corporate environmental investments on the basis of minimizing liability risks also anticipated EMS implementation to reduce the potential of environmental liability (Table 8.7: Germany - p = 0.00001; UK - p = 0.07). 'Improved competitive prowess' (Table 8.7: UK - p = 0.007; Germany - p = 0.0002) and 'maintenance of company market position' (Table 8.7: UK - p = 0.005; Germany - p = 0.00001) were also identified as benefits of EMS implementation by UK and German firms which associated

environmental investments with competitive advantage. Table 8.7 also identified more statistically significant correlations with German firms which had introduced environmental investments on the basis of image and marketing considerations. Both UK and German firms in this cohort held the view that EMS implementation would contribute to maintaining the company market position (Table 8.7: UK - $p = 0.01$; Germany - $p = 0.0004$) whilst significant numbers of the German cohort associated EMS implementation with an improved company image, competitive prowess, more environmentally-friendly products, increased staff motivation and a greater consideration of customer needs.

Table 8.6: Corporate Orientations and Environmental Attitude Correlations

Correlations between Corporate Orientations and Environmental Attitudes	**Probability Distribution**	
	UK	**Germany**
Minimizing Liability Risks		
"Thorough corporate environmental management is necessary in the face of increased legal liability risks"	χ^2, r = 1.14, df =2 p = 0.56	χ^2, r = 12.58, df = 2 p = 0.001
"Qualified staff are attracted to us because of our ecologically responsible production methods"	χ^2, r = 1.15, df = 2 p = 0.56	χ^2, r = 7.30, df = 2 p = 0.02
"Legislative pressure has prompted the use of stricter environmental controls within companies"	χ^2, r = 2.62, df = 2 p = 0.26	χ^2, r = 6.82, df = 2 p = 0.03
"Laws and prohibitions on the environment have reached the limit of their effectiveness"	χ^2, r = 0.60, df = 2 p = 0.73	χ^2, r = 6.24, df = 2 p = 0.04
Image and Marketing Considerations		
"Safeguarding jobs and economic success is of paramount importance in our company"	χ^2, r = 2.42, df = 2 p = 0.29	χ^2, r = 7.68, df = 2 p = 0.02
"Thorough corporate environmental management is necessary in the face of increased legal liability risks"	χ^2, r = 0.43, df = 2 p = 0.80	χ^2, r = 8.78, df = 2 p = 0.01
"Long-term economic success is not imaginable without considering ecological demands"	χ^2, r = 4.79, df = 2 p = 0.09	χ^2, r = 7.88, df = 2 p = 0.01
"Qualified staff are attracted to us because of ecologically responsible production methods"	χ^2, r = 1.17, df = 2 p = 0.55	χ^2, r = 11.38, df = 2 p = 0.003
"Environmental standards **NOT** too high" (**Germany**)	χ^2, r = 3.25, df = 2 p = 0.19	χ^2, r = 8.44, df = 2 p = 0.01
Winning New Customers		
"Safeguarding jobs and economic success is of paramount importance in our company"	χ^2, r = 6.50, df = 2 p = 0.03	χ^2, r = 4.98, df = 2 p = 0.08

Table 8.7: Corporate Orientations and Environmental Attitude Correlations (Problems implementing EMS)

Problems implementing EMS:	Probability Distribution	
	UK	Germany
Reduction of Costs		
Problems organising personnel	χ^2, r = 0.03, df = 1 p = 0.85	χ^2, r = 4.75, df = 1 p = 0.02
Conflicts with other systems	χ^2, r = 4.56, df = 1 p = 0.03	χ^2, r = 7.81, df = 1 p = 0.005
Extra work for staff	χ^2, r = 5.31, df = 1 p = 0.02	χ^2, r = 2.09, df = 1 p = 0.14
Inconvenience in the face of additional responsibilities	χ^2, r = 4.60, df = 1 p = 0.03	χ^2, r = 1.08, df = 1 p = 0.29
Environmental information and training needs	χ^2, r = 6.87, df = 1 p = 0.008	χ^2, r = 0.002, df = 1 p = 0.95
Too limited support from outside the Company	χ^2, r = 3.12, df = 1 p = 0.07	χ^2, r = 5.42, df = 1 p = 0.01
Total 'Greening' of the Company		
Extra work for staff	χ^2, r = 0.41, df = 1 p = 0.51	χ^2, r = 4.59, df = 1 p = 0.03
Increase in company costs	χ^2, r = 1.31, df = 1 p = 0.25	χ^2, r = 14.28, df = 1 p = 0.0001
Competitive Advantage		
Inconvenience in the face of additional responsibilities	χ^2, r = 4.16, df = 1 p = 0.04	χ^2, r = 3.81, df = 1 p = 0.05
Upholding Authority Standards		
Problems associated with organising personnel	χ^2, r = 3.87, df = 1 p = 0.04	χ^2, r = 0.24, df = 1 p = 0.61
Opposition on the part of the workers	χ^2, r = 10.97, df = 1 p = 0.0009	χ^2, r = 0.82, df = 1 p = 0.36

Table 8.7: Corporate Orientations and Environmental Attitude Correlations (Advantages implementing EMS) (ctd.)

Advantages implementing EMS:	Probability Distribution	
	UK	Germany
Reduction of Costs		
Improved company image	χ^2, r = 1.21, df = 1 p = 0.27	χ^2, r = 5.87, df = 1 p = 0.01
Resource savings	χ^2, r = 4.78, df = 1 p = 0.02	χ^2, r = 3.19, df = 1 p = 0.07
Cost savings	χ^2, r = 19.6, df = 1 p = 0.00001	χ^2, r = 20.3, df = 1 p = 0.00001
Minimizing Liability Risks		
Risk reduction in terms of environmental liability legislation	χ^2, r = 3.22, df = 1 p = 0.07	χ^2, r = 20.6, df = 1 p = 0.00001
Maintenance of company market position	χ^2, r = 0.04, df =1 p = 0.83	χ^2, r = 4.40, df = 1 p = 0.03
Image and Marketing Considerations		
Improved company image	χ^2, r = 3.42, df = 1 p = 0.06	χ^2, r = 9.21, df = 1 p = 0.002
Improved competitive prowess	χ^2, r = 0.45, df = 1 p = 0.49	χ^2, r = 11.35, df = 1 p = 0.0007
More environmentally-friendly products	χ^2, r = 0.15, df = 1 p = 0.69	χ^2, r = 7.39, df = 1 p = 0.006
Increased staff motivation	χ^2, r = 0.05, df = 1 p = 0.81	χ^2, r = 3.92, df = 1 p = 0.04
Greater consideration of customer needs	χ^2, r = 0.16, df = 1 p = 0.68	χ^2, r = 4.92, df = 1 p = 0.02
Maintenance of company market position	χ^2, r = 6.31, df = 1 p = 0.01	χ^2, r = 12.15, df = 1 p = 0.0004
Total 'Greening' of Company		
Greater consideration of changing customer needs	χ^2, r = 4.26, df = 1 p = 0.03	χ^2, r = 0.8, df = 1 p = 0.34
Gaining Competitive Advantage		
Improved competitive prowess	χ^2, r = 7.05, df = 1 p = 0.007	χ^2, r = 13.4, df = 1 p = 0.0002
More environmentally-friendly products	χ^2, r = 3.73, df = 1 p = 0.05	χ^2, r = 3.35, df = 1 p = 0.06
Increased staff motivation	χ^2, r = 1.90, df = 1 p = 0.16	χ^2, r = 5.23, df = 1 p = 0.02
Maintenance of company market position	χ^2, r = 7.81, df = 1 p = 0.005	χ^2, r = 20.78, df = 1 p = 0.00001
Winning New Customers		
Improved company image	χ^2, r = 1.16, df = 1 p = 0.28	χ^2, r = 4.22, df = 1 p = 0.03
Improved competitive prowess	χ^2, r = 1.06, df = 1 p = 0.30	χ^2, r = 12.9, df = 1 p = 0.0003
More environmentally-friendly products	χ^2, r = 0.14, df = 1 p = 0.70	χ^2, r = 5.38, df = 1 p = 0.02
Greater consideration of changing customer needs	χ^2, r = 4.64, df = 1 p = 0.03	χ^2, r = 0.32, df = 1 p = 0.56

Research results suggested that Hypothesis Four 'There is no correlation between environmental values and company size' should be rejected. In many instances statistical tests examining this hypothesis revealed a general correlation between environmental values although statistical significance was not achieved. Statistically significant correlations are listed in Table 8.8.

Table 8.8: Environmental Values and Company Size Correlations

We are acquainted with the relevant/most recent environmental legislation: (Germany - χ^2, r = 14.50, df = 8, p = 0.06; UK - χ^2, r = 3.01, df = 8, p = 0.93)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	42.9	59.4	65.6	63.3
Germany%	57.7	69.4	61.3	86.7	87.0
Our firm does much to enhance the physical environment: (UK - χ^2, r = 2.96, df = 8, p = 0.93; Germany - χ^2, r = 6.09, df = 8, p = 0.63)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	28.6	31.3	28.1	40.0
Germany%	46.2	50.0	48.4	56.7	73.9
Almost all employees are interested in possible ways to improve our firm: (UK - χ^2, r = 16.79, df = 8, p = 0.03; Germany - χ^2, r = 2.94, df = 8, p = 0.93)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	85.7	50.0	40.6	26.7
Germany%	53.8	61.3	64.5	73.3	69.6
Environmental protection is a compulsory part of employee training: (UK - χ^2, r = 10.51, df = 8, p = 0.23; Germany - χ^2, r = 13.85, df = 8, p = 0.08)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	-	21.9	21.9	30.0
Germany%	7.7	19.4	22.6	13.3	43.5

Table 8.8: Environmental Values and Company Size Correlations (ctd.)

All employees have easy access to comprehensive and practical information about environmental practices in our firm: (Germany - χ^2, r = 18.46, df = 8, p = 0.01; UK - χ^2, r = 8.16, df = 8, p = 0.41)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	7.1	43.8	34.4	40.0
Germany%	30.8	38.7	58.1	56.7	73.9
The person responsible for environmental affairs has a lot of influence: (UK - χ^2, r = 5.19, df = 8, p = 0.73; Germany - χ^2, r = 10.43, df = 8, p = 0.23)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	35.7	40.6	46.9	30.0
Germany%	23.1	27.4	25.8	43.3	47.8
All employees must regularly attend training courses in their area of work: (Germany - χ^2, r = 31.91, df = 8, p = 0.0001; UK - χ^2, r = 11.07, df = 8, p = 0.08)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	7.1	28.1	31.3	46.7
Germany%	7.7	21.0	29.0	46.7	65.2
We are often praised because of our efforts to enhance the environment: (Germany - χ^2, r = 14.97, df = 8, p = 0.05; UK - χ^2, r = 4.48, df = 8, p = 0.81)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	7.1	15.6	15.6	16.7
Germany%	7.7	8.1	19.2	20.7	42.1
Our company engages in discussions about improving environmental practice with other firms: (UK - χ^2, r = 9.15, df = 8, p = 0.32; Germany - χ^2, r = 13.25, df = 8, p = 0.10)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	7.1	28.1	28.1	33.3
Germany%	7.7	19.4	12.9	30.0	43.5
We regularly conduct training sessions in preparation for environmentally dangerous situations: (Germany - χ^2, r = 26.9, df = 8, p = 0.0007; UK - 7.05, df = 8, p = 0.53)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	-	15.6	12.5	26.7
Germany%	7.7	16.1	25.8	43.3	47.8
We actively encourage companies to adopt an environmental strategy similar to our own: (Germany - χ^2, r = 17.41, df = 8, p = 0.02; UK - χ^2, r = 11.80, df = 8, p = 0.16)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	-	21.9	18.8	20.0
Germany%	3.8	6.5	9.7	13.3	30.4

Hypothesis Five 'There is no correlation between environmental values and industry sectors' was not proven, although percentage distributions indicated that firms in the Chemicals, Rubber and Plastic industry sector were more closely associated with sentiments promoting the enhancement of the physical environment than other sectors and highly sensitive to the impacts of environmental legislative change. Examples of correlations supporting the null hypothesis are found in Table 8.9.

Table 8.9: Environmental Values and Industry Sector Correlations

We are acquainted with the relevant and most recent environmental legislation: (UK - χ^2, r = 4.34, df = 6, p = 0.62; Germany - χ^2, r = 7.64, df = 6, p = 0.26)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK %	68.8	54.1	52.4	68.4
Germany%	81.8	63.3	69.7	74.3
Our firm does much to enhance the physical environment: (UK - χ^2, r = 4.15, df = 6, p = 0.65; Germany - χ^2, r = 5.30, df = 6, p = 0.50)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK %	43.8	27.0	33.3	21.1
Germany%	61.4	43.3	51.5	62.9
Environmental protection is a compulsory part of employee training: (UK - χ^2, r = 10.74, df = 6, p = 0.09; Germany - χ^2, r = 9.02, df = 6, p = 0.17)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK %	34.4	16.2	23.8	10.5
Germany%	27.3	15.0	12.1	28.6
The person responsible for environmental affairs has a lot of influence: (UK - χ^2, r = 5.88, df = 6, p = 0.43; Germany - χ^2, r = 10.86, df = 6, p = 0.09)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK %	50.0	35.1	42.9	26.3
Germany%	50.0	26.7	21.2	28.6
In this firm environmental protection guidelines are both clear and understandable: (UK - χ^2, r = 5.88, df = 6, p = 0.43; Germany - χ^2, r = 10.86, df = 6, p = 0.09)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK %	50.0	35.1	42.9	26.3
Germany%	50.0	26.7	21.2	28.6
We regularly conduct training sessions in preparation for environmentally dangerous situations: (UK - χ^2, r = 8.65, df = 6, p = 0.19; Germany - χ^2, r = 7.81, df = 6, p = 0.25)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK %	28.1	10.8	9.5	10.5
Germany%	34.1	16.7	18.2	37.1

Hypothesis Six 'There is no correlation between environmental attitudes and company size' was upheld. Little statistical evidence was produced to support the view that attitudes towards the environment are significantly related to company size. The following two correlations not supportive of the null hypothesis were identified:

'Thorough corporate environmental management is necessary in the face of increased legal liability risk': (Germany - χ^2, r = 18.35, df = 8, p = 0.01; UK - χ^2, r = 8.56, df = 8 p = 0.38).

'In the face of legislative pressure we have no choice but to extend corporate environmental practice within our firm': (Germany - χ^2, r = 15.77, df = 8, p = 0.04; UK - χ^2, r = 8.56, df = 8, p = 0.38).

Hypothesis Seven 'There is not a correlation between environmental attitudes and industry sector' was statistically supported. Although the Chemicals, Rubber and Plastic companies alongside those in the Food and Beverages sector in particular registered positive attitudinal responses towards environmental concerns or engagements, their sentiments did not translate into statistically significant evidence against the null hypothesis. The instance in which the p-value was below the significance level is listed in Table 8.10:

Table 8.10: Correlation between Environmental Attitudes and Industry Sector

Long-term economic success is not imaginable without considering ecological demands: (UK - χ^2, r = 16.42, df = 6, p = 0.01; Germany - χ^2, r = 6.98, df = 6, p = 0.32)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK %	71.9	56.8	28.6	63.2
Germany%	65.9	55.0	51.5	74.3

Research results did not support Hypothesis Eight 'There is not a correlation between corporate environmental values and corporate environmental attitudes'. The rejection of the null hypothesis can be illustrated by considering company responses to statements which are indicative of corporate values and examining these in relation to environmental attitudes towards company practices, environmental policy or legislation and envisaged problems or advantages accompanying environmental management system implementation defined in Questionnaire Sections 3.2, 3.3, 4.4 and 4.5. In Table 8.11 the first value examined is 'Our firm does much to enhance the physical environment', selected from Questionnaire Section 4.1(C). Statistically significant correlations were recorded with firms which claimed to have a high regard for enhancing the physical environment. German firms within this cohort were more likely to express the view that EMS implementation will be accompanied by conflicts with other management systems, extra work for staff, an increase in company costs and an overburdening requirement to produce information than German firms subject to the same examination but without this cohort. Similarly UK firms which claimed to have a high regard for enhancing the physical environment recorded significant correlations with the claim that EMS implementation resulted in an improved company image. The view that the precautionary principle had significantly influenced their environmental behaviour also significantly correlated with UK and German firms within this cohort. In Table 8.11 German firms were predominantly identified with statistically significant correlations where much influence was conferred to the individual responsible for corporate environmental management affairs. Correlations in relation to anticipated problems included 'conflicts with other management systems' and 'an increase in company costs', whilst anticipated benefits derived from EMS implementation included 'improved competitive prowess' and 'increased staff motivation'. In such German firms there appeared to be a greater awareness of the potential and actual corporate impacts of environmental principles such as the 'Polluter Pays' and '*Vorsorge*' discussed in Chapter Four. As indicated by statistically significant correlations, such firms also conveyed a greater

sensitivity to the impacts of environmental legislative or policy change without an observable dilution of traditional competitive practices which secure their economic success. German firms in which learning about environmental protection is a compulsory part of employee training recorded statistically significant correlations with the view that EMS implementation resulted in an increase in company costs but was equally the source of increased staff motivation and a catalyst for the development of environmentally-friendly products. Significant numbers of firms in this German cohort believed qualified staff are attracted to their firms in view of ecologically responsible production methods and the conviction that economic success was not imaginable without considering ecological demands. Corresponding firms in the UK significantly identified extra work for staff as a problem associated with EMS implementation.

Table 8.11: Correlations between Corporate Environmental Values and Corporate Environmental Attitudes

Environmental Values/Attitudes	**Probability Distribution**
Our firm does much to enhance the physical environment	
Conflicts with other Management Systems	UK - χ^2, r = 2.60, df = 2, p = 0.27; Germany - χ^2, r = 9.83, df = 2, p = 0.007
Extra work for Staff	UK - χ^2, r = 2.61, df = 2, p = 0.27; Germany - χ^2, r = 8.61, df = 2, p = 0.01
Increase in Company Costs	UK - χ^2, r = 1.71, df = 2, p = 0.42; Germany - χ^2, r = 9.31, df = 2, p = 0.009
An overburdening requirement to produce information	UK - χ^2, r = 1.35, df = 2, p = 0.50; Germany - χ^2, r = 12.53, df = 2, p = 0.001
An improved company image	UK - χ^2, r = 6.32, df = 2, p = 0.04; Germany - χ^2, r = 2.81, df = 2, p = 0.24
The Precautionary Principle has considerably influenced environmental behaviour within our industry	UK - χ^2, r = 9.23, df = 4, p = 0.05; Germany - χ^2, r = 22.03, df = 4, p = 0.0002
Cooperative and voluntary practices between companies have considerably influenced environmental behaviour within our industry	UK - χ^2, r = 14.64, df = 4, p = 0.005; Germany - χ^2, r = 4.54, df = 4, p = 0.33
Long-term economic success in our company is not imaginable without considering ecological demands	UK - χ^2, r = 1.81, df = 4, p = 0.76; Germany - χ^2, r = 36.21, df = 4, p = 0.00000
Qualified staff are attracted to us because of our ecologically responsible production methods	UK - χ^2, r = 16.89, df = 4, p = 0.002; Germany - χ^2, r = 17.53, df = 4, p = 0.001
The person responsible for environmental affairs in our company has a lot of influence	
Conflicts with other Management Systems	UK - χ^2, r = 1.87, df = 2, p = 0.39; Germany - χ^2, r = 8.43, df = 2, p = 0.001
Increase in company costs	UK - χ^2, r = 4.34, df = 2, p = 0.11; Germany - χ^2, r = 12.71, df = 2, p = 0.001
No problems anticipated	UK - χ^2, r = 0.10, df = 2, p = 0.95; Germany - χ^2, r = 9.05, df = 2, p = 0.05
Improved competitive prowess	UK - χ^2, r = 2.48, df = 2, p = 0.28; Germany - χ^2, r = 6.89, df = 2, p = 0.05
Increased staff motivation	UK - χ^2, r = 6.89, df = 2, p = 0.03; Germany - χ^2, r = 1.91, df = 2, p = 0.38

Table 8.11: Correlations between Corporate Environmental Values and Corporate Environmental Attitudes (ctd.)

Environmental Values/Attitudes	**Probability Distribution**
The person responsible for environmental affairs in our company has a lot of influence	
The Precautionary Principle has considerably influenced environmental behaviour within our industry	UK - χ^2, r = 0.97, df = 2, p = 0.91; Germany - χ^2, r = 13.92, df = 2, p = 0.007
The Polluter Pays Principle has considerably influenced environmental behaviour within our industry	UK - χ^2, r = 4.65, df = 2, p = 0.32; Germany - χ^2, r = 10.26, df = 2, p = 0.03
Safeguarding jobs and economic success is of paramount importance in our company	UK - χ^2, r = 11.42, df = 4, p = 0.02; Germany - χ^2, r = 13.92, df = 4, p = 0.007
Thorough corporate environmental management is necessary in the face of increased legal liability risk	UK - χ^2, r = 6.41, df = 4, p = 0.16; Germany - χ^2, r = 20.97, df = 4, p = 0.0003
Long-term economic success in our company is not imaginable without considering ecological demands	UK - χ^2, r = 9.83, df = 4, p = 0.04; Germany - χ^2, r = 47.47, df = 4, p = 0.00000
Qualified staff are attracted to us because of our ecologically responsible production methods	UK - χ^2, r = 10.93, df = 4, p = 0.02; Germany - χ^2, r = 38.77, df = 2, p = 0.00000
In the face of legislative pressure we have no choice but to extend corporate environmental practice within our firm	UK - χ^2, r = 2.47, df = 4, p = 0.64; Germany - χ^2, r = 11.38, df = 4, p = 0.02
In our firm learning about environmental protection is a compulsory part of employee training	
Extra work for staff	UK - χ^2, r = 5.74, df = 2, p = 0.05; Germany - χ^2, r = 0.85, df = 2, p = 0.65
Increase in company costs	UK - χ^2, r = 2.70, df = 2, p = 0.25; Germany - χ^2, r = 13.80, df = 2, p = 0.001
Environmentally-friendly products	UK - χ^2, r = 3.85, df = 2, p = 0.14; Germany - χ^2, r = 6.65, df = 2, p = 0.03
Increased staff motivation	UK - χ^2, r = 0.42, df = 2, p = 0.80; Germany - χ^2, r = 9.00, df = 2, p = 0.01
Economic instruments in the form of environmental permits and taxation have considerably influenced behaviour in our industry	UK - χ^2, r = 1.66, df = 2, p = 0.79; Germany - χ^2, r = 11.25, df = 2, p = 0.02
Long-term economic success in our company is not imaginable without considering ecological demands	UK - χ^2, r = 3.51, df = 2, p = 0.47; Germany - χ^2, r = 17.8, df = 2, p = 0.001
Qualified staff are attracted to us because of our ecologically responsible production methods	UK - χ^2, r = 8.29, df = 2, p = 0.08; Germany - χ^2, r = 47.12, df = 2, p = 0.00000

Hypothesis Nine 'There is not a correlation between corporate environmental attitudes and corporate environmental values' was rejected. Table 8.12 explored the probability distribution of environmental attitudes voiced by firms in relation to corporate environmental values defined in Questionnaire Sections 4.1 and 4.6. Both UK and German firms which expressed the view 'long-term economic success is not imaginable without considering ecological demands' shared statistically significant values. Table 8.12 indicated that more firms within than without this cohort were likely to identify the corporate environmental representative with considerable influence, regularly conduct training sessions in preparation for environmentally dangerous situations and were more often praised because of their efforts to enhance the physical environment. On the basis of such commitment these companies would be more inclined to externalise good environmental management practices through discussions with stakeholders or pioneering sound environmental techniques in a way that characterises the approach of environmental task-oriented firms (Finger et al 1996). Marginally more German firms within this cohort were identified as likely to associate commitments such as environmental learning, training with this sentiment or adopt guidelines which promote good environmental practices than their UK counterparts. German firms sharing these correlation patterns in general terms were also of the opinion that whilst national environmental standards are not too high the pressure exerted by policy instruments had influenced corporate environmental behaviour. Similar patterns of statistical significance were associated with German firms claiming the 'precautionary' and 'polluter-pays' principles have considerably influenced corporate environmental behaviour. Firms within this cohort were also more likely to be associated with extensive knowledge of relevant environmental legislation, a high evaluation of environmental responsibilities as well as the individual discharging them. Commitment to the physical environment expressed through company measures is designed to both enhance company relations with the environment and prevent the negative impacts of environmental hazards or accidents. Despite the consistency of these patterns amongst German firms, results in Table 8.12 were

not entirely supportive of the view that environmental behaviour was considerably influenced by the 'precautionary' principle. As previously indicated the view that the 'precautionary' principle has induced behavioural change is connected with a range of cultural predispositions which may or may not be supported by a Company Director. This position is consistent with attitudes towards corporate goals displayed by the majority of firms. In this research environmental commitment is primarily in response to the economic implications of the 'precautionary' principle, not the principle itself. Significant numbers of UK and German firms described cooperative and voluntary practices as weak influences on environmental behaviour, specifically in relation to environmental learning, strategies to enhance the physical environment and the dissemination of good environmental practices.

Table 8.12: Correlations between Corporate Environmental Attitudes and Corporate Environmental Values

Environmental Attitudes/Values	Probability Distribution
Long-term economic success in our company is not imaginable without considering ecological demands	
We are always acquainted with the relevant and most recent environmental legislation in our industry	UK - χ^2, r = 2.97, df = 4, p = 0.56; Germany - χ^2, r = 37.60, df = 4, p = 0.00000
Our firm does much to enhance the physical environment	UK - χ^2, r = 1.81, df = 2, p = 0.76; Germany - χ^2, r = 36.21, df = 2, p = 0.00000
Almost all employees are interested in possible ways to improve our firm	UK - χ^2, r = 1.45, df = 4, p = 0.83; Germany - χ^2, r = 13.63, df = 4, p = 0.008
Learning about the environment is a compulsory part of employee training	UK - χ^2, r = 3.51, df = 4, p = 0.47; Germany - χ^2, r = 17.87, df = 4, p = 0.001
We have accepted many suggestions as to how to improve the environmental practice of our firm	UK - χ^2, r = 3.41, df = 4, p = 0.49; Germany - χ^2, r = 30.33, df = 4, p = 0.00000
All employees have easy access to comprehensive and practical information about environmental practices in our firm	UK - χ^2, r = 5.85, df = 4, p = 0.21; Germany - χ^2, r = 28.69, df = 4, p = 0.00000
The person responsible for environmental affairs in our company has considerable influence	UK - χ^2, r = 9.83, df = 4, p = 0.04; Germany - χ^2, r = 47.47, df = 4, p = 0.00000
All employees are kept well informed about future developments in our firm	UK - χ^2, r = 6.70, df = 4, p = 0.15; Germany - χ^2, r = 15.92, df = 4, p = 0.003
In this firm environmental guidelines are both clear and understandable	UK - χ^2, r = 3.37, df = 4, p = 0.49; Germany - χ^2, r = 26.27, df = 4, p = 0.00000
All employees must regularly attend training courses in their area of work	UK - χ^2, r = 2.79, df = 4, p = 0.59; Germany - χ^2, r = 32.50, df = 4, p = 0.00000
We are often praised because of our efforts to enhance the physical environment'	UK - χ^2, r = 12.36, df = 4, p = 0.01; Germany - χ^2, r = 18.0, df = 4, p = 0.001
Our company engages in discussions about improving environmental practice with other firms	UK - χ^2, r = 9.21, df = 4, p = 0.05; Germany - χ^2, r = 15.69, df = 4, p = 0.003
In our firm we regularly conduct training sessions in preparation for environmentally dangerous situations	UK - χ^2, r = 14.39, df = 4, p = 0.006; Germany - χ^2, r = 24.10, df = 4, p = 0.00008
We actively encourage companies to adopt an environmental strategy similar to our own	UK - χ^2, r = 11.14, df = 4, p = 0.02; Germany - χ^2, r = 17.06, df = 4, p = 0.001

Table 8.12: Correlations between Corporate Environmental Attitudes and Corporate Environmental Values (ctd.)

Environmental Attitudes/Values	Probability Distribution
Our national environmental standards specific to our industry are *NOT* too high	
Almost all employees are interested in ways of improving our firm	UK - χ^2, r = 4.82, df = 4, p = 0.30; Germany - χ^2, r = 9.26, df = 4, p = 0.05
The person responsible for environmental affairs in our company has considerable influence	UK - χ^2, r = 14.03, df = 4, p = 0.007; Germany - χ^2, r = 7.77, df = 4, p = 0.10
We are often praised because of our efforts to enhance the physical environment	UK - χ^2, r = 6.07, df = 4, p = 0.19; Germany - χ^2, r = 11.61, df = 4, p = 0.02
We actively encourage companies to adopt an environmental strategy similar to our own	UK - χ^2, r = 10.30, df = 4, p = 0.03; Germany - χ^2, r = 3.71, df = 4, p = 0.44
Policy instruments in the form of statutory laws and prohibitions have considerably influenced environmental behaviour within our industry	
We are always acquainted with the relevant and most recent environmental legislation in our industry sector	UK - χ^2, r = 7.28, df = 4, p = 0.12; Germany - χ^2, r = 11.78, df = 4, p = 0.01
The following actors are the most influential promoters or drivers of environmental protection within UK and German firms:	
Company Management	UK - χ^2, r = 6.67, df = 2, p = 0.03; Germany - χ^2, r = 0.06, df = 2, p = 0.96
(Local) Authorities	UK - χ^2, r = 2.98, df = 2, p = 0.22; Germany - χ^2, r = 9.02, df = 2, p = 0.01
Environmental Legislation	UK - χ^2, r = 6.99, df = 2, p = 0.03; Germany - χ^2, r = 4.12, df = 2, p = 0.12
Legislative pressure has prompted the use of stricter environmental controls within companies	
We are praised for our customer service	UK - χ^2, r = 4.28, df = 4, p = 0.36; Germany - χ^2, r = 13.74, df = 4, p = 0.008
All employees have easy access to comprehensive and practical information about environmental practices in our firm	UK - χ^2, r = 1.23, df = 4, p = 0.87; Germany - χ^2, r = 13.73, df = 4, p = 0.008

Table 8.12: Correlations between Corporate Environmental Attitudes and Corporate Environmental Values (ctd.)

Environmental Attitudes/Values	Probability Distribution
The Precautionary Principle has considerably influenced environmental behaviour within your industry	
We are often praised for our company service	UK - χ^2, r = 14.58, df = 4, p = 0.005; Germany - χ^2, r = 12.93, df = 4, p = 0.01
We are always acquainted with the relevant and most recent environmental legislation in our industry sector	UK - χ^2, r = 6.83, df = 4, p = 0.14; Germany - χ^2, r = 20.49, df = 4, p = 0.0004
Our firm does much to enhance the physical environment	UK - χ^2, r = 10.27, df = 4, p = 0.03 Germany - χ^2, r = 19.48, df = 4, p = 0.0006
Protecting the environment is *NOT* more important than business profit in our firm	UK - χ^2, r = 9.26, df = 4, p = 0.05; Germany - χ^2, r = 9.46, df = 4, p = 0.05
Almost all employees are interested in possible ways to improve our firm	UK - χ^2, r = 0.65, df = 4, p = 0.95 Germany - χ^2, r = 11.58, df = 4, p = 0.02
The person responsible for environmental affairs in our company has a lot of influence	UK - χ^2, r = 0.78, df = 4, p = 0.94; Germany - χ^2, r = 14.07, df = 4, p = 0.007
In this firm environmental protection guidelines are both clear and understandable	UK - χ^2, r = 4.90, df = 4, p = 0.29; Germany - χ^2, r = 11.39, df = 4, p = 0.02
We are often praised because of our efforts to enhance the physical environment	UK - χ^2, r = 6.19, df = 4, p = 0.18; Germany - χ^2, r = 9.78, df = 4, p = 0.04
In our firm we regularly conduct training sessions in preparation for environmentally dangerous situations	UK - χ^2, r = 4.02, df = 4, p = 0.40; Germany - χ^2, r = 6.15, df = 4, p = 0.04
The Polluter Pays Principle has considerably influenced environmental behaviour within your industry	
We are often praised for our customer service	UK - χ^2, r = 6.08, df = 4, p = 0.19; Germany - χ^2, r = 10.66, df = 4, p = 0.03
We are always acquainted with the relevant and most recent environmental legislation in our industry sector	UK - χ^2, r = 9.05, df = 4, p = 0.05; Germany - χ^2, r = 1.79, df = 4, p = 0.77
The person responsible for environmental affairs in our company has a lot of influence	UK - χ^2, r = 4.65, df = 4, p = 0.32; Germany - χ^2, r = 10.66, df = 4, p = 0.03

Table 8.12: Correlations between Corporate Environmental Attitudes and Corporate Environmental Values (ctd.)

Environmental Attitudes/Values	Probability Distribution
Cooperative and voluntary practices between companies have considerably influenced environmental behaviour within your industry	
In our firm learning about environmental protection is *NOT* a compulsory part of employee training	UK - χ^2, r = 10.93, df = 4, p = 0.02; Germany - χ^2, r = 3.74, df = 4, p = 0.44
We are *NOT* often praised because of our efforts to enhance the physical environment	UK - χ^2, r = 10.20, df = 4, p = 0.03; Germany - χ^2, r = 1.05, df = 4, p = 0.90
Our company *DOES NOT* engage in discussions about improving environmental practice with other firms	UK - χ^2, r = 12.66, df = 4, p = 0.01; Germany - χ^2, r = 6.92, df = 4, p = 0.13
The Precautionary Principle has *NOT* considerably influenced environmental behaviour within your industry	
Company Directors (described as most influential in promoting or driving corporate environmental protection)	UK - χ^2, r = 11.72, df = 4, p = 0.002; Germany - χ^2, r = 6.57, df = 4, p = 0.03

Hypothesis Ten 'There is not a correlation between industry sectors and environmental concern' was largely supported. Out of 20 tests three tests rejected the null hypothesis. Instances of significant p-values are listed in Table 8.13:

Table 8.13: Correlation between Environmental Concern and Industry Sector

'Technological invention will solve pollution problems': (Germany - χ^2, r = 22.7, df = 6, p = 0.0009)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
Germany%	70.5	55.0	51.5	34.3
'Ecologically-sensitive management practice within firms will endanger the survival prospects of such firms in the foreseeable future': (Germany - χ^2, r = 12.79, df = 6, p = 0.04)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
Germany%	75.0	65.0	60.6	60.0
'All employees should be taught about environmental protection as part of their occupational training': (UK - χ^2, r = 13.54, df = 6, p = 0.03)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK %	93.8	89.2	85.7	68.4

Despite the absence of statistically significant correlations more firms expressed concern about the impacts of negative corporate environmental activity or sentiments in favour of promoting environmental protection practice than were indifferent to these impacts or activities. Generally more firms in the Chemicals, Rubber and Plastic industries expressed these views than firms in other industry sectors (Table 8.13). Hypothesis Eleven 'There is not a correlation between industry sectors and environmental commitment' was also partially supported. The p-value was less than the significance level in 3 tests but the majority of tests were supportive of the null hypothesis. The significant correlations are listed in Table 8.14.

Table 8.14: Correlation between Industry Sectors and Environmental Commitment

Reuse of waste materials (UK - χ^2, r = 30.51, df = 6, p = 0.00003)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
UK%	90.6	40.5	85.7	89.5
Providing personnel with information and training regarding ecological issues (Germany - χ^2, r = 13.57, df = 6, p = 0.03)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
Germany%	54.5	28.3	39.4	54.3
Reinforcing control of environmentally relevant activities (Germany - χ^2, r = 18.6, df = 6, p = 0.004)				
Sector	Chem/Rub/Pl	Machinery	Pul/Paper/Pack	Food/Bev
Germany%	70.5	45.0	34.4	57.1

Although research results indicated general increases in environmental commitment, which corresponded with company size, statistical significance was often not demonstrated. Therefore, Hypothesis Twelve 'There is not a correlation between environmental commitment and company size' can be described as largely rejected. The five correlations which were statistically significant are listed in Table 8.15 alongside examples of correlations where the p-value was marginally higher than the statistical level or company size percentages were suggestive of a correlation between expressed environmental commitment and company size.

Table 8.15: Correlation between Environmental Commitment and Company Size

Energy Saving and Improving Energy Efficiency: (UK - χ^2, r = 20.9, df = 8, p = 0.007; Germany - χ^2, r = 14.04, df = 8, p = 0.08)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	57.1	90.6	93.8	97.7
Germany%	69.2	80.6	93.5	96.7	91.3
Environmentally oriented Transport (of Raw Materials): (UK - χ^2, r = 10.48, df = 8, p = 0.23; Germany - χ^2, r = 3.26, df = 8, p = 0.91)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	28.6	18.8	28.1	43.3
Germany%	50.0	51.6	51.6.	53.3	56.5
Reuse of Waste Materials: (UK, χ^2, r = 18.49, df = 8, p = 0.01; Germany - χ^2, r = 13.22, df = 8, p = 0.10)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	35.7	71.9	78.1	86.7
Germany%	61.5	79.0	61.3	83.3	91.3
Avoidance/Minimisation of waste: (UK - χ^2, r = 16.49, df = 8, p = 0.06; Germany - χ^2, r = 15.24, df = 8, p = 0.05)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	78.6	93.8	90.0	90.0
Germany%	65.4	83.9	87.1	90.0	95.7
Water and Effluent Reduction: (UK - χ^2, r = 18.09, df = 8, p = 0.002; Germany - χ^2, r = 11.99, df = 8, p = 0.15)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	42.9	53.1	62.5	80.0
Germany%	61.5	67.7	83.9	90.0	87.0
Dealing with Water-damaging Substances: UK - χ^2, r = 13.10, df = 8, p = 0.10; Germany - χ^2, r = 2.19, df = 8, p 0.97)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	21.4	31.3	53.1	60.0
Germany%	69.2	71.0	80.6	76.7	78.3
Control and Reduction of Emissions: UK - χ^2, r = 12.25, df = 8, p = 0.14; Germany - χ^2, r = 8.10, df = 8, p = 0.42)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	35.7	65.6	75.0	80.0
Germany%	69.2	71.0	80.6	76.7	78.3
Changing existing Production Processes: (UK - χ^2, r = 16.1, df = 8, p = 0.06; Germany - χ^2, r = 12.09, df = 8, p = 0.14)					
UK %	-	28.6	40.6	65.6	53.3
Germany%	19.2	38.7	38.7	36.7	52.2
Introducing New Production Processes: (UK - χ^2, r = 18.6, df = 8, p = 0.01; Germany - χ^2, r = 7.9, df = 8, p = 0.49)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	21.4	40.6	62.5	63.3
Germany%	26.9	48.4	51.6	36.7	52.2

Table 8.15: Correlation between Environmental Commitment and Company Size (ctd.)

Creating Environmentally Suitable Products: (UK - χ^2, r = 10.87, df = 8, p = 0.20; Germany - χ^2, r = 9.29, df = 8, p = 0.31)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	14.3	43.8	46.9	43.3
Germany%	53.8	58.1	54.8	60.0	73.9
Ecological Product Development: (UK - χ^2, r = 9.10, df = 8, p = 0.33; Germany - χ^2, r = 6.93, df = 8, p = 0.54)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	7.1	28.1	31.3	30.0
Germany%	38.5	53.2	51.6	40.0	52.2
Improving the Environmental Practices of Contractors and Suppliers: (UK - χ^2, r = 9.75, df = 8, p = 0.28; Germany - χ^2, r = 4.91, df = 8, p = 0.76)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	21.4	31.3	31.3	56.7
Germany%	23.1	33.9	22.6	36.7	39.1
Preventing and Restricting Environmentally-damaging Accident/Disturbances: (UK - χ^2, r = 5.75, df = 8, p = 0.67; Germany - χ^2, r = 6.78, df = 8, p = 0.56)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	64.3	78.1	81.3	90.0
Germany%	65.4	79.0	64.5	73.3	78.3
Providing Personnel with Information and Training regarding Ecological Issues: (UK - χ^2, r = 7.99, df = 8, p = 0.43; Germany - χ^2, r = 9.01, df = 8, p = 0.34)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	35.7	34.4	46.9	60.0
Germany%	30.8	38.7	35.5	63.3	47.8
Improving Technical Equipment: (UK - χ^2, r = 7.49, df 8,p = 0.48; Germany - χ^2, r = 14.12, df = 8, p = 0.06)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	50.0	71.9	65.6	63.3
Germany%	50.0	80.6	64.5	80.0	87.0
Environmentally sensitive Purchasing: (UK - χ^2, r = 5.09, df = 8, p = 0.74; Germany - χ^2, r = 6.93, df = 8, p = 0.54)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	28.6	37.5	37.5	40.0
Germany%	57.7	61.3	67.7	66.7	60.9
Reinforcing control of Environmentally relevant Activities: (UK - χ^2, r = 6.37, df = 8, p = 0.60; Germany - χ^2, r = 14.04, df = 8, p = 0.08)					
Comp Size	1-9	10-49	50-99	100-249	250-500
UK %	-	42.9	50.0	53.1	56.7
Germany%	38.5	48.4	38.7	75.9	65.2

Hypothesis Thirteen 'There is not a correlation between corporate environmental knowledge and company size' was rejected on the basis of research findings on German firms and UK firms. The relationship between company size and environmental knowledge was demonstrated where more firms in larger firm size categories claimed familiarity with the elements of environmental management systems than those in smaller firm size categories[138].

Table 8.16: Correlation between Environmental Knowledge and Company Size

Good Management Practices: EMAS, UK - χ^2, r = 11.63, df = 4, p = 0.02; Germany - χ^2, r = 49.47, df = 4, p = 0.00000; ISO, UK - χ^2, r = 6.25, df = 4, p = 0.18; Germany - χ^2, r = 38.3, df = 4, P = 0.00000
Environmental Site Audit: EMAS, UK - χ^2, r = 9.85, df = 4, p = 0.04; Germany - χ^2, r = 21.84, df = 4, p = 0.0002; ISO, UK - χ^2, r = 6.94, df = 4, p 0.13; Germany χ^2, r = 34.5, df = 4, p = 0.00000
Environmental Management System: EMAS, UK - χ^2, r = 10.8, df = 4, p = 0.02; Germany - χ^2, r = 41.28, df = 4, p = 0.000000; ISO UK - χ^2, r = 6.85, df = 4, p = 0.14; Germany - χ^2, r = 45.32, df = 4, P = 0.00000
Environmental Review: EMAS, UK - χ^2, r = 11.28, df = 4, p = 0.02; Germany - χ^2, r = 46.92, df = 4, p = 0.00000; ISO UK - χ^2, r = 15.41, df = 4, p 0.003, Germany - χ^2, r = 34.54, df = 4, P = 0.00000
Formulation of an Environmental Policy: EMAS, UK - χ^2, r = 16.07, df = 4, p = 0.002; Germany - χ^2, r = 48.03, df = 4, p = 0.00000; ISO UK - χ^2, r = 10.36, df = 4, p = 0.03; Germany - χ^2, r = 34.25, df = 4, P = 0.00000
Environmental Statement: EMAS, UK - χ^2, r = 14.7, df = 4, p = 0.005; Germany - χ^2, r = 44.89, df = 4, p = 0.00000; ISO, UK - χ^2, r = 12.21, df = 4, p = 0.01; Germany - χ^2, r = 25.6, df = 4, P = 0.00004
Certification/Validation: EMAS, UK - χ^2, r = 9.33, df = 4, p = 0.05; Germany - χ^2, r = 29.30, df = 4, p = 0.00001; ISO, UK - 7.16, df = 4, p = 0.12; Germany - χ^2, r = 28.2, df = 4, p = 0.00001
None of the elements: EMAS UK - χ^2, r = 17.71, df = 4, p = 0.001; Germany - χ^2, r = 32.67, df = 4, p = 0.00000; ISO, UK - χ^2, r = 16.28, df = 4, p = 0.002; Germany - χ^2, r = 29.0, df = 4, p = 0.00001

[138]The statistically significant correlations in Table 8.16 have been calculated on firm responses which feature in Tables 8.24 and 8.25.

Hypothesis Fourteen 'There is no correlation between environmental values and environmental action' was rejected on the basis of research findings. The statistically significant correlations recorded by UK and German firms using certified and verified systems are listed in Table 8.17.

Table 8.17: Correlations between Corporate Environmental Values and Corporate Environmental Action

'We are always acquainted with the relevant and most recent environmental legislation in our industry sector': EMAS - Germany - χ^2, r = 10.04, df = 2, p = 0.006; ISO - UK - χ^2, r = 5.62, df = 2, p = 0.06
'Our firm does much to enhance the physical environment': EMAS - Germany - χ^2, r = 8.73, df = 2, p = 0.01; ISO - UK - χ^2, r = 8.38, df = 2, p = 0.01
'In our firm learning about environmental protection is a compulsory part of employee training': EMAS - Germany - χ^2, r = 7.46, df = 2, p = 0.06; ISO - UK - χ^2, r = 30.57, df = 2, p = 0.00000
'All employees have easy access to comprehensive and practical information about environmental practices in our firm': EMAS - Germany - χ^2, r = 12.85, df = 2, p = 0.001; ISO - UK - χ^2, r = 10.42, df = 2, p = 0.005
'The person responsible for environmental affairs in our company has considerable influence': EMAS - Germany - χ^2, r = 12.88, df = 2, p = 0.001
'Environmental protection guidelines are both clear and understandable': EMAS - Germany - χ^2, r = 13.51, df = 2, p = 0.001; ISO - UK - χ^2, r = 13.77, df = 2, p = 0.001
'All employees must regularly attend training courses in their area of work': EMAS - Germany - χ^2, r = 21.21, df = 2, p = 0.00002
'We are often praised because of our efforts to enhance the environment': EMAS - Germany - χ^2, r = 14.92, df = 2, p = 0.0005; ISO - UK - χ^2, r = 16.47, df = 2, p = 0.0002
'Our company engages in discussions about improving environmental practice with other firms': EMAS - Germany - χ^2, r = 11.94, df = 2, p = 0.002; ISO - UK - χ^2, r = 9.99, df = 2, p = 0.006
'In our firm we regularly conduct training sessions in preparation for environmentally dangerous situations': EMAS - Germany - χ^2, r = 28.4, df = 2, p = 0.00000; ISO - UK - χ^2, r = 15.39, df = 2, p = 0.0004
'We actively encourage companies to adopt an environmental strategy similar to our own': EMAS - Germany - χ^2, r = 26.4, df = 2, p = 0.00000; ISO - UK - χ^2, r = 13.4, df = 2, p = 0.001; Germany - χ^2, r = 6.87, df = 2, p = 0.03

Hypothesis Fifteen 'There is no correlation between environmental attitudes and environmental action' was largely supported by the research results. Table 8.18 lists the three attitudinal statements expressed only by German firms which yielded statistically significant correlations with environmental action.

Table 8.18: Correlations between Corporate Environmental Attitudes and Corporate Environmental Action

'Thorough corporate environmental management is necessary in the face of increased legal liability risk': EMAS - Germany - χ^2, r = 7.32, df = 2, p = 0.002; ISO - UK - χ^2, r = 0.87, df = 2, p = 0.64
'Long-term economic success in our company is not imaginable without considering ecological demands': EMAS - Germany - χ^2, r = 12.77, df = 2, p = 0.001; ISO - UK - χ^2, r = 3.51, df = 2, p = 0.17
'Qualified staff are attracted to us because of our ecologically responsible production methods': EMAS - Germany - χ^2, r = 8.62, df = 2, p = 0.01; ISO - Germany - χ^2, r = 8.9, df = 2, p = 0.01; UK - χ^2, r = 1.2, df = 2, p = 0.54

Hypothesis Sixteen 'There is no correlation between industry sectors and environmental action was inconclusive. Although the p-value was lower than the significance level in the case of industry sectors with ISO certification (UK - χ^2, r = 9.38, df = 3, p = 0.02; [UK - Chemicals, Rubber and Plastic - 18.8%, Machinery - 0.0%, Pulp, Paper and Packaging - 4.8%, Food and Beverages - 5.3%; Germany - Chemicals, Rubber and Plastic - 9.1%, Machinery - 5.0%, Pulp, Paper and Packaging - 3.0%, Food and Beverages - 11.4%]) this was not achieved in the consideration of EMAS verification. Hypothesis Seventeen 'There is not a correlation between company size and environmental action' was rejected on the basis of German firm responses and partially disproved on the basis of UK firm responses. Whilst many UK firm responses were not statistically significant, correlations between environmental practice and company size were identified and recorded in Table 8.19[139].

[139]The statistically significant correlations in Table 8.19 have been calculated on firm responses which feature in Tables 8.24 and 8.25.

Table 8.19: Correlation between Company Size and Corporate Environment Action

Good Management Practices: EMAS - UK - χ^2, r = 5.22, df = 4, p = 0.26; Germany - χ^2, r = 48.2, df = 4, p = 0.00000; ISO, UK - χ^2, r = 2.50, df = 4, p = 0.64; Germany - χ^2, r = 24.2, df = 4, p = 0.00007
Environmental Site Audit: EMAS, UK - χ^2, r = 2.54, df = 4, p = 0.63; Germany - χ^2, r = 28.9, df = 4, p = 0.0001; ISO, UK - χ^2, r = 2.35, df = 4, p 0.67; Germany - χ^2, r = 21.34, df = 4, p = 0.00002
Environmental Management System: EMAS, UK - χ^2, r = 1.12, df = 4, p = 0.88; Germany - χ^2, r = 51.25, df = 4, p = 0.00000; ISO UK - χ^2, r = 0.95, df = 4, p = 0.91; Germany - χ^2, r = 29.1, df = 4, p = 0.00001
Environmental Review: EMAS, UK - χ^2, r = 3.10, df = 4, p = 0.54; Germany - χ^2, r = 41.32, df = 4, p = 0.00000; ISO UK - χ^2, r = 4.26, df = 4, p 0.37, Germany - χ^2, r = 21.4, df = 4, p = 0.00002
Formulation of an Environmental Policy: EMAS, UK - χ^2, r = 0.35, df = 4, p = 0.98; Germany - χ^2, r = 48.0, df = 4, p = 0.00000; ISO UK - χ^2, r = 9.26, df = 4, p = 0.05; Germany - χ^2, r = 24.32, df = 4, p = 0.00007
Environmental Statement: EMAS, UK - χ^2, r = 4.25, df = 4, p = 0.37; Germany - χ^2, r = 36.93, df = 4, p = 0.00000; ISO, UK - χ^2, r = 3.06, df = 4, p = 0.54; Germany - χ^2, r = 26.5, df = 4, p = 0.00002
Certification/Validation: EMAS, UK - none; Germany χ^2, r = 34.74, df = 4, p = 0.00000; ISO, UK - 1.75, df = 4, p = 0.78; Germany χ^2, r = 26.5, df = 4, p = 0.00002
None of the elements: EMAS UK - χ^2, r = 5.02, df = 4, p = 0.28; Germany - χ^2, r = 43.70, df = 4, p = 0.00000; ISO, UK - χ^2, r = 10.27, df = 4, p = 0.03; Germany - χ^2, r = 29.28, df = 4, p = 0.00004

Research results did not support Hypothesis Eighteen 'There is not a correlation between corporate orientations and environmental action'. This was illustrated by analysing environmental investments of UK and German firms in relation to the EMAS and ISO 14001 elements these firms had introduced. In Table 8.20 a statistically significant level of German firms were identified which aimed at reducing costs through environmental investments, such as material and product process substitutions or introducing corporate measures designed to minimize environmental liability, conducted EMAS Environmental Reviews. In contrast the Environmental Review process was more closely identified with UK firms in relation to image and marketing considerations or competitive advantage. UK and German firms pursuing image and marketing benefits or competitive advantage from environmental investments also shared similar understandings of the benefits which could be derived from practising EMAS or ISO 14001 system elements. Certified and verified EMS ownership in the UK and Germany was strongly associated with company image/marketing and competitive advantage strategies. A structured environmental management system was closely associated with strong environmental image and marketing credentials, as was the EMAS Environmental Site Audit process, the Environmental Policy and generally Good Management Practices. High levels of UK firms and statistically significant levels of German firms which had introduced corporate environmental measures to gain competitive advantage and win new customers also possessed ISO 14001 certified systems. Verified EMAS systems were also closely associated with German firms promoting their environmental image and attempting to gain competitive advantage through environmental measures. Statistically significant numbers of UK firms which had introduced environmental measures in order to uphold authority standards had developed an EMS, Environmental Policies or possessed ISO 14001 certified systems. German companies which had made extensive 'green' or 'ecologically-oriented' investments identified Good Management Practices, the Environmental Site Audit and the Environmental Management Review as key components of environmental action.

Table 8.20: Corporate Orientations and Environmental Action Correlations (EMAS)

Environmental Investments/ Implemented EMAS Elements	**Probability Distribution**	
Reduction of Costs	**UK**	**Germany**
Environmental Review	χ^2, r = 3.46, df = 1 p = 0.06	χ^2, r = 10.17, df = 1 p = 0.04
Minimizing Liability Risks		
Environmental Review	χ^2, r = 0.24, df = 1 p = 0.62	χ^2, r = 4.45, df = 1 p = 0.03
Environmental Policy	χ^2, r = 0.48, df = 1 p = 0.48	χ^2, r = 5.49, df = 1 p = 0.01
Image and Marketing Considerations		
Good Management Practices	χ^2, r = 4.47, df = 1 p = 0.03	χ^2, r = 2.57, df =1 p = 0.10
Environmental Site Audit	χ^2, r = 3.97, df = 1 p = 0.04	χ^2, r = 5.10, df = 1 p = 0.02
Environmental Management System	χ^2, r = 6.95, df = 1 p = 0.008	χ^2, r = 17.52, df = 1 p = 0.00003
Environmental Review	χ^2, r = 8.78, df = 1 p = 0.003	χ^2, r = 1.57, df = 1 p = 0.20
Environmental Policy	χ^2, r = 1.50, df = 1 p = 0.21	χ^2, r = 5.18, df = 1 p = 0.02
Environmental Statement	χ^2, r = 4.40, df = 1 p = 0.03	χ^2, r = 2.70, df = 1 p = 0.10
EMAS Verification/Certification	χ^2, r = 0.04, df = 1 p = 0.82	χ^2, r = 3.32, df = 1 p = 0.06
Gaining Competitive Advantage		
Good Management Practices	χ^2, r = 5.47, df = 1 p = 0.01	χ^2, r = 0.97, df = 1 p = 0.32
Environmental Management System	χ^2, r = 6.82, df = 1 p = 0.008	χ^2, r = 2.34, df = 1 p = 0.12
Environmental Management Review	χ^2, r = 7.39, df = 1 p = 0.006	χ^2, r = 2.90, df = 1 p = 0.08
EMAS Verification/Certification	χ^2, r = 1.12, df = 1 p = 0.28	χ^2, r = 3.09, df = 1 p = 0.07
Winning New Customers		
Environmental Site Audit	χ^2, r = 0.83, df = 1 p = 0.35	χ^2, r = 4.94, df = 1 p = 0.02

Table 8.20: Corporate Orientations and Environmental Action Correlations (ISO 14001) (ctd.)

Environmental Investments/ Implemented ISO 14001 Elements	**Probability Distribution**	
Minimizing Liability Risks	**UK**	**Germany**
Good Management Practices	χ^2, r = 1.39, df = 1 p = 0.23	χ^2, r = 4.59, df = 1 p = 0.03
Image and Marketing Considerations		
Good Management Practices	χ^2, r = 5.93, df = 1 p = 0.01	χ^2, r = 6.67, df = 1 p = 0.009
Environmental Management System	χ^2, r = 2.95, df = 1 p = 0.08	χ^2, r = 4.86, df = 1 p = 0.02
Environmental Management Review	χ^2, r = 6.67, df = 1 p = 0.009	χ^2, r = 3.32, df = 1 p = 0.06
Environmental Policy	χ^2, r = 8.31, df = 1 p = 0.003	χ^2, r = 2.01, df = 1 p = 0.15
Total 'Greening' of Company		
Good Management Practices	χ^2, r = 0.22, df = 1 p = 0.63	χ^2, r = 4.69, df = 1 p = 0.03
Environmental Site Audit	χ^2, r = 0.27, df = 1 p = 0.60	χ^2, r = 4.96, df = 1 p = 0.02
Environmental Management Review	χ^2, r = 0.27, df = 1 p = 0.60	χ^2, r = 4.96, df = 1 p = 0.02
Gaining Competitive Advantage		
Good Management Practices	χ^2, r = 4.97, df = 1 p = 0.02	χ^2, r = 5.59, df = 1 p = 0.01
Environmental Site Audit	χ^2, r = 7.48, df = 1 p = 0.006	χ^2, r = 5.59, df = 1 p = 0.01
Environmental Management System	χ^2, r = 5.77, df = 1 p = 0.01	χ^2, r = 2.39, df = 1 p = 0.12
Environmental Management Review	χ^2, r = 7.48, df = 1 p = 0.006	χ^2, r = 5.59, df = 1 p = 0.01
Environmental Statement	χ^2, r = 3.02, df = 1 p = 0.08	χ^2, r = 9.60, df = 1 p = 0.001
ISO 14001 Certification	χ^2, r = 3.21, df = 1 p = 0.07	χ^2, r = 9.60, df = 1 p = 0.001
Winning New Customers		
Environmental Statement	χ^2, r = 0.26, df = 1 p = 0.60	χ^2, r = 4.03, df = 1 p = 0.04
ISO 14001 Certification	χ^2, r = 3.07, df = 1 p = 0.07	χ^2, r = 8.34, df = 1 p = 0.003
Upholding Authority Standards		
Environmental Management System	χ^2, r = 7.74, df = 1 p = 0.005	χ^2, r = 1.20, df = 1 p = 0.27
Environmental Policy	χ^2, r = 6.10, df = 1 p = 0.01	χ^2, r = 1.95, df = 1 p = 0.16
ISO 14001 Certification	χ^2, r = 6.74, df = 1 p = 0.009	χ^2, r = 1.32, df = 1 p = 0.25

Hypothesis Nineteen 'There is not a correlation between institutional factors and country' was not supported. Research results in Table 8.21 identified significantly more German respondents requesting environmental support from the *Handelskammer*, the German Chambers of Commerce, than UK firms requested from the corresponding source (Germany - 57.5%, UK - 14.5%: χ^2, r = 37.20, df = 1, p = 0.00000). In turn more UK firms sought assistance from Government institutions such as DEFRA or the Environment Agency (Envirowise) than German firms requested from the *Umweltbundesamt* (UK - 60.2%, Germany - 31.9%: χ^2, r = 15.6, df = 1, p = 0.00008). More UK firms also sought business support from Green Business Clubs than German firms (UK - 28.9%, Germany - 3.5%: χ^2, r = 25.16, df = 1, p = 0.00000). Applying the same test to UK and German companies with an EMS reproduced statistically significant levels of requests from German firms for support from their *Handelskammer* (Table 8.21: Germany - 32.3%, UK - 4.8%: χ^2, r = 5.67, df = 1, p = 0.01). Support from Government organisations such as the Environment Agency, Envirowise and the *Umweltbundesamt* were similar whilst marginally more UK firms were supported by organisations such as the Green Business Club. However, statistically significant numbers of German firms claimed to have also received support during EMS implementation from 'Other Organisations' (Table 8.21: Germany - 32.3%, UK - 4.8%: χ^2, r = 5.67, df = 1, p = 0.01).

Table 8.21: Environmental Management Advice and Support Requested

Anticipated Support - Firms without an EMS	**UK %**	**Germany%**
Chambers of Commerce	14.5	57.5
Trade Associations	44.6	54.9
Financial Organisation/Credit Company	2.4	5.3
Government Institutions (ie EA, *UBA*)	60.2	31.9
Environmental Organisations (ie Green Business Clubs, *Unternehmensgrün*)	28.9	3.5
Scientific/Academic Institutions	9.6	10.6
Source of Support - Firms with an EMS	**UK %**	**Germany%**
Chambers of Commerce	4.8	32.3
Trade Associations	47.6	45.2
Financial Organisation/Credit Company	0.0	12.9
Government Institutions (ie EA, *UBA*)	42.9	41.9
Environmental Organisations (ie Green Business Clubs, *Unternehmensgrün*)	19.0	9.7
Scientific/Academic Institutions	9.5	19.4

8.2 Research Analysis and Discussion

8.2.1 Company Culture

Research results reveal that 'corporate environmental improvement', as an objective in itself, is not pursued by either UK or German SMEs. The majority of interviewees expressed the view that legislative change to protect the physical environment invariably reduced the operational scope of business. As a result cost reducing strategies were an instinctive response to business demands which may or may not positively impact attitudes towards environmental protection. This approach is linked to the fact that environmental protection has been perceived by business owners and decision makers to be adjunct to central corporate themes. As is suggested by the non-respondent results in Table 7.9 environmental engagement and information requirements within smaller companies often suffer from time constraints which impede the ability of management to make carefully considered decisions or result in the deferment of environmental activities in view of limited information. Related to time constraints are the dynamics of unpredictability which more readily determine the rhythm of smaller companies than larger companies. The systematic and interminable character of the environmental management project may not be attuned to the familiar cultural patterns of a small enterprise. The failure to address environmental protection issues as a company goal in the earlier phases of mapping company objectives was described as partly attributable to the hitherto subordinate role played by environmental protection in business enterprise and also the consequence of the complexity of the environmental objectives and their interrelated nature:

> "A lot of people would say - just where do you start with the environment ... corporate goals are about profit making - corporate goals are mainly in quality, profit making - the old adage applies - 'if you can't make more than you can buy, invest it in the high street bank because you shouldn't be in business'." **Environmental Manager, Food Sector**.

> *"Die privaten Kunden, die wir zum Beispiel haben - die interessiert das nicht - ob wir umweltfreundlich drucken oder ob wir normal drucken - das wäre mehr eine Sache der Industrie und mehr eine Sache der Öffentlichen als für den Auftragsgeber, denn die Privatkundschaft - sie interessiert nur "wie sieht mein Produkt aus?" - sie sind also wenig damit zu beeinflussen"*

(Our private customers, for example, aren't interested in it - whether our printing methods are environmentally-friendly or normal - that is more an issue for industry and the public at large than it is for clients, because the only real interest of private customers is "what does my product look like?" - they are hardly influenced by environmental issues)

"Ich bin überrascht das zu hören, denn allem Anschein nach, ist Deutschland und sind die Deutschen in bezug auf Umwelt-angelegenheiten, hochsensibilisiert" (I am surprised to hear this since Germany is and the Germans are portrayed as very keen to engage in environmental affairs)

"Ja natürlich, das tun sie auch - zum Beispiel unsere Mitarbeiter sind mit Begeisterung daran gegangen - das ist kein Problem. Wenn man das EMAS in Ruhe betrachtet und die Zeit hat, sich mit ihm lang und breit auseinanderzusetzen, dann schon. Aber das müßte normalerweise mehr durch die Medien geschehen." (Yes of course, the Germans are in practice - for example our employees took up EMAS with enthusiasm - there isn't any problem on that score. If one is able to consider EMAS without pressure and one has the time to analyse the length and breadth of the system, then everything's fine. But this [analysis role] would normally have to be performed by the media) **Company Owner, Paper Sector.**

For interviewed companies a more important consideration than the position of environmental protection in company goal priorities is the estimation of whether pursuing environmental protection goals have a positive or negative impact on reaching company goals. Environmental investment, which may be sizeable, primarily and predominantly centres around factors which enhance economic gain and company survival. The percentage distributions in Tables 8.1 to 8.4 highlight the centrality of cost and corporate liability imperatives in the business decision making process, echoed by the following interviewee sentiments:

"... Eine volle Ökologisierung ist, meines Erachtens, nicht realisierbar in unserer Marktwirtschaft. Die Aufgabe der Unternehmensleitung besteht darin, darüber zu entscheiden, welche Belastungen zuerst reduziert werden sollten, zu entscheiden welchen Belastungen eine höhere Priöritat zu geben ist..." (The full greening of the company is in my view not a realistic proposition in our market economy. The task of Company Directors is to decide what pollution should be reduced first, to decide which forms of pollution should be given the highest priority.) **Company Director, Printing Sector**.

"In a nutshell, our corporate goal right now is one of survival - it is as severe as that - I don't think we are alone in that situation as a manufacturer - it is cost cutting, increasing our competitiveness - all with a view of surviving and then hopefully making some money." **Engineering Director, Machinery**.

"Since I am in an influential position then my personal views of the physical environment will be reflected by my views, ie, our methods of working, but they are always tempered by cost implications - that is in everything we do, everything we do - I've got to be honest and admit we are looking at short

> term costs. Short-term costs are of paramount importance. If we could, for example, envisage a situation that would save us 'X' pounds' today but would cost us '2X pounds' in a year's time for having saved those pounds today, the chances are that we would do that because survival is the order of the day; tomorrow is another day." **Director, Machinery**.

> "*Ich denke „Umwelt" ist schon Priorität gewesen hier aber die Prioritäten liegen momentan in der Firma ganz woanders; es geht mehr oder weniger um das geschäftliche Überleben ....*" (It would be true to say that 'the environment' has been a priority here but currently the priorities in the firm are in quite a different place; the priority is more or less an issue of company survival.) **Company Director, Packaging**.

Interviewees who combined product quality objectives in their corporate strategy were all of the opinion that products differentiated by higher quality and processing standards attract customer loyalty and the synergies associated with a positive company image. Establishing differentiation with both economic and ecological competitive advantages was normally achieved over relatively longer periods of time or in some cases was more speedily secured upon the foundation of previously achieved competitive advantages. Interviews were also generally supportive of the view that differentiation strategies require strong innovative prowess, a strong market orientation and high levels of flexibility between employers and employees (Porter 1985). One of the key motives for developing a market niche strategy was the pursuit of competitive advantage through the focused use of resources and development of products with specific customer orientation. Specialising to meet customer requirements led to a particular form of production, which was complimented by strategies which could be described as environmentally friendly. Contingent upon this approach is a specialist knowledge base and specialist competence, which allowed for further modifications resulting in a consolidated market position. Although company cost reduction continued to be the prime issue, the intensive consideration that these firms directed to the requirements and problems of specific customer groups diverted the corporate focus away from simply quantitative cost examinations and towards the satisfaction of special and environmental needs of the customer for as long as there was a business demand for the product. The advantage of an environmental differentiation strategy within the context of a niche market is that additional special

product factors provide scope for further competitive advantage. The mindset of firms operating a cost leadership strategy was more sensitive to the financial implications of the embrace of corporate environmentalism as illustrated by the following company manager:

> *"Wir versuchen natürlich auch alle unsere Abfälle der Wiederverwertung in den Abfallkreislauf wieder unterzubringen.... Wir würden vielleicht auch mehr festschreiben für die Umwelt aber das ist halt eine Kostenfrage.... Öko Audit wäre schon erstrebenswert aber das kostet Geld."* (Of course we also try to reintroduce all of our waste in the ecocycle stream.... We would perhaps do more for the environment but it's all a question of cost .... Eco Auditing is certainly worth doing but it costs money.) **Company Manager, Packaging**.

One of the justifications for not developing environmental capacities with an EMS cited by some interviewed SMEs with a cost leadership strategy was that valorised company processes did not add any value to the product. For other companies concerned about maximising profit, it is in the final analysis irrelevant whether environmental costs or general costs are reduced. More important is the correlation of the variables of environmental protection and cost minimisation with given business decisions and measures. Company decision-making scenarios in relation to the environment are essentially defined by the general principles described in Table 8.22. Ideal environmental measures belong to Category 1: they lead to a reduction of both environmental pollution and costs. Measures of Category 2 or 3 result in either cost savings or environmental improvement. Since there is no conflict of interests environmental decision-making is not difficult. Acceptance of the measures in Category 6 is not normal when the logic of traditional economics is followed. Making environmental decisions is more difficult in those situations where the interests of costs and positive environmental impacts are in contention, as in the case of Categories 4 and 5. For the majority of interviewed companies the embrace of the environmental option was described as driven by competitive advantage implications and not primarily altruistic, reflective understandings of the firm's relationship with nature.

Table 8.22: Company Activities and their Impact on the Environment and Costs

	Impact on:		
Category Options	**Costs**	**Environmental Pollution**	**Activity Evaluation**
1	Save	Reduce	Most Acceptable
2	Indifferent	Reduce	Acceptable
3	Save	Indifferent	Acceptable
4	Increase	Reduce	Questionable
5	Save	Increase	Questionable
6	Increase	Increase	Least Acceptable

Measures in Category 4 include situations which engender economic loss but contain prerequisites within the integrated context of sustainability. Economic loss may assume the form of internalised costs, such as environmental taxation, or information about environmental conditions and consequent environmental goals which require additional company resources to translate. EMS implementation falls within this category of measures and was undertaken by a minority of SMEs in this research. Those which adopted strategies in Category 4 were motivated by the prospect of future financial gains drawn primarily from company cost reductions, marketing and liability savings, along with possible environmental aspirations.

8.2.2 Corporate Environmental Culture

Corporate environmental culture is concerned with the ideologies, knowledge, assumptions, beliefs and expectations through which corporate character and behaviour can be identified. The division of corporate culture into environmental value and attitude categories serves to contextualise corporate environmental communication in terms of understanding, aspirations, goals and actual environmental propensities of firms. Environmental values have been defined as being expressed through the orientations of defined environmental objectives and as judgement systems for all objects of attitude (Urban 1986, p. 364). Urban also describes environmental attitudes as mediating between espoused values and actual behaviour, being defined through emotions from which emanate behaviour regulating influences. In this model the construct corporate environmental culture has included an examination of forms of environmental concern, knowledge and understanding which shape the dominant environmental beliefs and attitudes within

organisations (Pautzke 1989, Kirsch 1990, Downs 1971, Sears 1980, Kinder and Kiewit 1981).

In Chapter Three it is argued that analysis of cognitive and affective dimensions of environmental consciousness unconnected to defined conative dimensions of environmental consciousness can furnish misleading understandings of environmental value-attitude-behaviour relations. 'Attitudes' have been described as evaluative beliefs prompting behaviour (Rokeach 1973) or responses rooted in value orientations which mediate between espoused values and behaviour (Fishbein and Ajzen 1975, Urban 1986). The interrelatedness of environmental values and attitudes is demonstrated in this research through Hypotheses Eight and Nine, which identified statistically significant correlations between environmental values and attitudes. Overall, more UK respondents felt their firm's behaviour was affected by environmental policy instruments and legislative pressure in its various forms than German respondents (Table 8.23). More German respondents also felt statutory laws and environmental prohibitions have reached the limit of their effectiveness. A larger percentage of UK respondents believed the precautionary principle had made a marked impact on industry behaviour (Table 8.23: Precautionary Principle has influenced behaviour: UK - 45.0%, Germany 43.6%; Precautionary Principle has not influenced behaviour: UK - 8.3%, Germany - 20.9%). However, where environmental values are correlated with environmental attitudes, as in Tables 8.11 and 8.12, more instances of statistical significance were recorded amongst German firms. For example, more German firms which claimed to have enhanced the physical environment stated they had been influenced by legislation embodying the precautionary and polluter pays principles than their UK counterparts (Table 8.11).

Table 8.23: Statements regarding Policy/Governmental Influence on Environmental Behaviour

Attitude towards Environmental Policy Influences	UK %		Germany%	
	Yes	No	Yes	No
Policy instruments in the form of statutory laws and prohibitions have considerably influenced environmental behaviour within your industry	76.1	5.5	69.2	14.0
Environmental problems are primarily caused by industry but it is the Government via policy which is left to search for the solution to these problems	44.0	33.0	42.4	27.9
Legislative pressure has prompted the use of stricter environmental controls within companies	92.7	2.8	58.1	18.0
The 'Precautionary Principle' has considerably influenced environmental behaviour within your industry	45.0	8.3	43.6	20.9
The 'Polluter Pays Principle' has considerably influenced environmental behaviour within your industry	67.0	6.4	47.7	19.8
Cooperative and voluntary practices between companies have considerably influenced environmental behaviour within your industry	33.0	22.0	19.2	38.4
Economic instruments in the form of environmental permits and taxation have considerably influenced environmental behaviour within your industry	53.2	9.2	48.8	28.5
Statutory laws and prohibitions on the environment have reached the limit of their effectiveness	14.7	59.6	45.9	24.4

German firms which claimed learning about environmental protection was a compulsory part of employee training more closely associated this activity with environmentally-friendly production and the acquisition of ecologically-oriented and qualified staff than UK firms. These German firms were also more conscious of the impact of economic instruments than their UK counterparts and more inclined to believe economic success is unimaginable without considering the ecological demands of business activities. Statistically significant numbers of German firms in which the environmental representative exercised a lot of influence associated EMS implementation with potential conflicts with other Management Systems, increases in company costs coupled with improved competitive prowess whilst statistically significant numbers of these influential UK environmentalists associated EMS implementation with increased staff motivation (Table 8.11). German firms which associated economic success with ecological considerations were also more likely than corresponding UK firms to demonstrate strong environmental orientations and support measures employed to achieve these environmental objectives. Associated environmental orientations listed in Table 8.12 are as follows:

- familiarity with relevant environmental legislation;
- promotion of measures to substantially enhance the physical environment;
- employee interest in enhancing company performance;
- promotion of corporate environmental knowledge;
- promotion of corporate environmental learning culture;
- promotion of knowledge based culture;
- high evaluation/extensive influence of corporate environmental representative;
- maintenance of clear and understandable environmental guidelines;
- regular conduct of environmental emergency drills;
- external promotion of good environmental practices;
- internal promotion of environmental culture through the external praise received for good environmental practices.

UK and German firms which held the view that national legislation embodying the precautionary principle had influenced their corporate behaviour shared similar values and aspirations, such as introducing company measures to enhance the physical environment. However, German firms holding this view were more positively associated with a wider range of corporate environmental indicators which reflect environmental commitment than UK firms (Table 8.12). Rejection of Hypothesis Fourteen 'There is no correlation between environmental values and environmental action' supports the argument that values and behaviour are codeterminant and attitudinal responses mediate between these codeterminants. The statistically significant correlations recorded by UK and German firms in Table 8.17 using certified and verified systems were identical with the environmental orientations listed above in relation to the view that securing economic success is unimaginable without considering the ecological impacts of business activities. Although attitudes have been described as being rooted in value orientations which prompt behaviour, this research identified less and weaker correlations between environmental attitudes and environmental action than between environmental values and environmental action. Hypothesis Fifteen 'There is no correlation

between environmental attitudes and environmental action' was largely supported by the research results and three significant correlations were only associated with German SMEs. The inconclusive relationship between environmental attitudes and behaviour was illustrated during interviews with UK and German firm representatives. Most interviewees were able to speak competently about environmental issues relevant to their business and expressed concern about the degradation of the physical environment. The majority of interviewees equally indicated that *understanding* the importance of environmental issues does not in itself suffice to animate far reaching behavioural change in the workplace. For example, some German interviewees displayed frustration about the financial impacts of the *Ökologische Steuerreform* and other legislative changes which can be understood as symbolic restrictions on personal freedoms even though there was a recognition that these legislative changes served the collective interests of the community. Research results illustrate the indeterminate relation between attitude and action; another example was the significant variance between the number of firms supporting environmental training in principle (Questionnaire Section 3.1 (H): 'All employees should be taught about environmental protection as part of their occupational training': UK - 86.2%, Germany - 87.2%) and actual adherents of this principle (Questionnaire Section 4.1 (F): 'In our firm learning about environmental protection is a compulsory part of employee training': UK - 22.0%, Germany - 20.3%). Research results in Table 8.24 identified UK SMEs with more knowledge of ISO 14001 elements and practice of ISO 14001 elements than German SMEs. A greater percentage of German SMEs claimed to have knowledge of EMAS elements but comparatively more UK firms were familiar with both EMAS and ISO 14001 elements than their German counterparts (on the basis of Table 8.24: No Knowledge of EMAS + ISO 14001 elements: UK - 32.1%, Germany - 53.3%). More UK SMEs than German SMEs also practised at least one element of EMAS or ISO 14001 (on the basis of Tables 8.24: No Practice of EMAS + ISO 14001 elements: UK - 62.8%, Germany - 72.9%), however, where levels of EMS element knowledge and EMS element practice are compared, the link

between environmental knowledge and action is more pronounced amongst German firms. Larger company size categories also recorded higher levels of environmental practice in relation to possessed knowledge of EMAS and ISO 14001 elements than smaller company size categories amongst German firms. These correlations were most evident throughout the EMAS elements (Site Audit, Environmental Management System, Environmental Review, Environmental Policy, EMAS Verification), which German SMEs more readily adopted (Table 8.24). Correlations based on larger company size categories and environmental practice in relation to possessed knowledge were only recorded amongst UK firms developing Environmental Statements within ISO 14001 (Table 8.25). A greater percentage of UK SMEs claiming EMAS element knowledge in the 10-49 company size category were identified as being more likely to practice these elements than any other UK company size category, however, no UK company within this small enterprise category possessed a certified EMS (Table 8.25). In this research only German SMEs recorded ownership of EMAS (Table 8.24: Verification/Validation: Germany - 12.2%) whilst similar percentages of UK and German SMEs used ISO 14001 (Table 8.24: Certification/Validation: UK - 7.3%; Germany - 7.0%). In addition to commitment to EMAS, more German SMEs produced Environmental Statements which involves robust corporate ecological investigations. Whilst the Environmental Statement increases the level of corporate environmental knowledge available to decision makers, the exercise invariably increases the range of work associated with other EMS elements, such as the Environmental Audit and Environmental Review, as has been highlighted in the consideration of value-attitude correlations. Consequently the use of the Environmental Statement can be used as an indicator of the degree of corporate ecological engagement (Wohlfarth and Signon 1997).

Table 8.24: Environmental Management System Engagement

Familiarity with EMAS Elements	**UK %**	**Germany%**
Good Management Practices	47.7	24.4
Environmental Site Audit	48.6	34.3
Environmental Management System	43.1	36.6
Environmental Review	45.0	30.8
Formulation of an Environmental Policy	49.5	30.8
Environmental Statement	43.1	30.2
Verification/Validation	29.4	39.5
None of the above	33.0	45.6
Practised EMAS Elements		
Good Management Practices	9.2	19.2
Environmental Site Audit	15.6	22.1
Environmental Management System	6.4	18.6
Environmental Review	6.4	18.0
Formulation of an Environmental Policy	7.3	19.2
Environmental Statement	2.8	13.4
Verification/Validation	0.0	12.2
None of the above	70.6	64.5
Familiarity with ISO 14001 Elements	**UK %**	**Germany%**
Good Management Practices	51.4	21.5
Environmental Site Audit	48.6	24.4
Environmental Management System	46.8	26.2
Management Review	65.1	24.4
Formulation of an Environmental Policy	55.0	22.1
Environmental Statement	36.7	19.2
Certification/Validation	39.4	27.3
None of the above	31.2	61.0
Practice of ISO 14001 Elements		
Good Management Practices	19.3	8.1
Environmental Site Audit	25.7	11.0
Environmental Management System	12.8	9.9
Management Review	32.1	10.5
Formulation of an Environmental Policy	29.4	9.9
Environmental Statement	2.8	7.0
Certification/Validation	7.3	7.0
None of the above	55.0	81.4
Practice/Familiarity - EMAS/ISO 14001	**UK %**	**Germany%**
Good Management Practices	28.4	58.1
Environmental Site Audit	37.9	54.7
Environmental Management System	21.1	44.3
Environmental Review	31.8	50.7
Formulation of an Environmental Policy	34.1	53.5
Environmental Statement	7.0	40.4
Verification/Validation	9.3	28.2

Table 8.25: Environmental Management System Engagement (EMAS Practice/Familiarity Percentage)

Practice/Familiarity Percentage (EMAS)	UK %	Germany%
Overall		
Good Management Practices	19.2	78.6
Environmental Site Audit	32.0	64.4
Environmental Management System	14.8	50.8
Environmental Review	14.2	58.4
Formulation of an Environmental Policy	14.7	62.3
Environmental Statement	6.4	44.3
Verification/Validation	0.0	30.8
Company Size: 10-49		
Good Management Practices	49.7	59.2
Environmental Site Audit	49.7	46.6
Environmental Management System	100.0	16.4
Environmental Review	49.7	24.8
Formulation of an Environmental Policy	14.2	8.2
Environmental Statement	100.0	11.0
Verification/Validation	0.0	5.8
Company Size 50-99		
Good Management Practices	24.9	57.0
Environmental Site Audit	26.2	54.6
Environmental Management System	7.6	29.4
Environmental Review	6.2	58.3
Formulation of an Environmental Policy	12.6	50.1
Environmental Statement	0.0	30.0
Verification/Validation	0.0	20.0
Company Size 100-249		
Good Management Practices	22.2	83.2
Environmental Site Audit	26.6	73.4
Environmental Management System	17.7	66.7
Environmental Review	33.3	64.2
Formulation of an Environmental Policy	18.8	68.8
Environmental Statement	18.3	64.2
Verification/Validation	0.0	64.2
Company Size 250-500		
Good Management Practices	0.0	88.2
Environmental Site Audit	41.0	86.7
Environmental Management System	12.5	73.7
Environmental Review	5.2	72.1
Formulation of an Environmental Policy	9.5	82.4
Environmental Statement	0.0	55.5
Verification/Validation	0.0	66.7

Table 8.25: Environmental Management System Engagement (Practice/Familiarity Percentage EMAS - Industry Sector) (ctd.)

Practice/Familiarity Percentage (EMAS)	UK %	Germany%
Chemicals, Rubber and Plastic		
Good Management Practices	11.8	83.1
Environmental Site Audit	31.2	70.7
Environmental Management System	10.6	50.1
Environmental Review	5.5	56.3
Formulation of an Environmental Policy	10.0	62.3
Environmental Statement	5.5	61.6
Verification/Validation	0.0	33.2
Machinery		
Good Management Practices	23.5	75.1
Environmental Site Audit	28.5	57.0
Environmental Management System	21.4	26.1
Environmental Review	11.7	46.0
Formulation of an Environmental Policy	16.6	69.1
Environmental Statement	6.6	28.7
Verification/Validation	0.0	21.1
Pulp, Paper and Packaging		
Good Management Practices	33.3	87.6
Environmental Site Audit	42.9	69.2
Environmental Management System	14.4	79.8
Environmental Review	37.5	81.9
Formulation of an Environmental Policy	12.5	85.8
Environmental Statement	14.4	54.6
Verification/Validation	0.0	50.0
Food and Beverages		
Good Management Practices	11.1	71.5
Environmental Site Audit	33.3	59.9
Environmental Management System	14.4	62.5
Environmental Review	16.7	53.9
Formulation of an Environmental Policy	24.9	47.1
Environmental Statement	0.0	35.7
Verification/Validation	0.0	26.3
Companies with Verified EMAS	**UK %**	**Germany%**
Company Sectors:		
Chemicals, Rubber and Plastic	0.0	13.6
Machinery	0.0	6.7
Pulp, Paper and Packaging	0.0	18.2
Food and Beverages	0.0	14.3

Table 8.25: Environmental Management System Engagement (ISO 14001 Practice/Familiarity Percentage) (ctd.)

Practice/Familiarity Percentage (ISO 14001)	UK %	Germany%
Overall		
Good Management Practices	37.5	37.6
Environmental Site Audit	52.8	45.0
Environmental Management System	27.3	37.7
Environmental Review	49.3	43.0
Formulation of an Environmental Policy	53.4	44.7
Environmental Statement	7.6	36.4
Certification/Validation	18.5	25.6
Company Size: 10-49		
Good Management Practices	24.8	0.0
Environmental Site Audit	66.8	32.9
Environmental Management System	33.1	0.0
Environmental Review	66.8	32.9
Formulation of an Environmental Policy	66.8	0.0
Environmental Statement	0.0	0.0
Certification/Validation	0.0	0.0
Company Size 50-99		
Good Management Practices	44.6	42.9
Environmental Site Audit	66.7	36.3
Environmental Management System	28.5	42.9
Environmental Review	45.4	36.3
Formulation of an Environmental Policy	38.8	44.4
Environmental Statement	0.0	22.4
Certification/Validation	22.4	20.1
Company Size 100-249		
Good Management Practices	46.6	36.2
Environmental Site Audit	41.2	41.7
Environmental Management System	25.0	46.5
Environmental Review	47.7	33.2
Formulation of an Environmental Policy	44.4	54.4
Environmental Statement	11.0	37.4
Certification/Validation	18.8	21.4
Company Size 250-500		
Good Management Practices	26.3	49.9
Environmental Site Audit	50.0	61.5
Environmental Management System	27.8	47.0
Environmental Review	54.1	61.5
Formulation of an Environmental Policy	71.4	53.8
Environmental Statement	11.8	63.5
Certification/Validation	20.0	53.8

Table 8.25: Environmental Management System Engagement (Practice/Familiarity Percentage ISO 14001 - Industry Sector) (ctd.)

Practice/Familiarity Percentage (ISO 14001)	UK %	Germany%
Chemicals, Rubber and Plastic		
Good Management Practices	46.5	40.0
Environmental Site Audit	62.6	50.0
Environmental Management System	36.8	38.6
Environmental Review	57.1	42.9
Formulation of an Environmental Policy	50.0	38.6
Environmental Statement	6.6	36.4
Certification/Validation	37.6	30.8
Machinery		
Good Management Practices	29.9	37.5
Environmental Site Audit	50.0	40.1
Environmental Management System	18.7	36.6
Environmental Review	38.4	40.1
Formulation of an Environmental Policy	54.8	62.4
Environmental Statement	0.0	26.4
Certification/Validation	0.0	23.0
Pulp, Paper and Packaging		
Good Management Practices	33.3	16.4
Environmental Site Audit	39.9	28.7
Environmental Management System	24.9	33.5
Environmental Review	54.5	28.7
Formulation of an Environmental Policy	44.2	24.7
Environmental Statement	16.7	14.1
Certification/Validation	12.5	12.3
Food and Beverages		
Good Management Practices	40.1	46.0
Environmental Site Audit	55.4	54.4
Environmental Management System	24.9	39.8
Environmental Review	53.8	54.4
Formulation of an Environmental Policy	66.7	46.0
Environmental Statement	16.7	49.7
Certification/Validation	14.4	30.7
Companies with Certified ISO 14001	**UK %**	**Germany%**
Company Sectors:		
Chemicals, Rubber and Plastic	18.8	9.1
Machinery	0.0	5.0
Pulp, Paper and Packaging	4.8	3.0
Food and Beverages	5.3	11.4

8.2.3 Corporate Environmental Engagement

The construct 'Corporate Environmental Engagement' refers to forms of company commitment directly related to enhancing ecological relations between the firm and the physical environment. Environmental engagement involves learning strategies which aim at affecting change in personnel environmental behaviour and corporate strategies. In this research the environmental elements of the EMAS and ISO 14001 management systems discussed in Chapter Five provide the framework for analysing and measuring corporate environmental action.

Research results indicate in Table 8.26 that the corporate goal response patterns of UK and German firms possessing an EMS were similar to those exhibited by UK and German firms enjoying good company performance or anticipating positive turnovers. In some instances response patterns identified as peculiar to UK or German firms in 8.1 and 8.3 were accentuated. For example, more UK firms with an EMS pursued market diversification (Table 8.26: UK - χ^2, r = 4.77, df = 1, p = 0.02) and cost reduction strategies (Table 8.26: Germany - χ^2, r = 5.10, df = 1, p = 0.02) compared to their German counterparts. More German than UK firms with an EMS were keen to market their company credentials (Table 8.26: Germany - χ^2, r = 4.77, df = 1, p = 0.02). Response patterns in relation to promoting product innovation were repeated whilst marginally less UK and more German firms with an EMS strengthened their environmental activities. Companies with positive turnover expectations were more likely to contemplate EMS development than companies with negative turnover expectations (Table 8.27).

Table 8.26: Corporate Goal Evaluation of UK and German Firms (EMS Ownership)

SME Corporate Goal Evaluation - EMS Ownership		
	UK %	Germany%
Diversification of Market	21.7	3.1
Promotion of Marketing/Sales	39.1	68.8
Investment in Production Technology	26.1	21.9
Improvement of Company Culture/Communication	30.4	28.1
Reducing Costs	65.2	34.4
Improvement of Motivation/ Qualification of Staff	17.4	9.4
Upgrading IT	8.7	9.4
Further Improvement of Quality Assurance	4.3	15.6
Intensifying Research / Development of Activities	13.0	9.4
Improving Company Competitiveness	52.2	43.8
Strengthening Environmental Activities	4.3	18.8
Promoting Product Innovation	17.4	37.5

Table 8.27: Turnover Expectations and SME Use of Environmental Management Systems

Turnover Expectations	UK %	Germany%
Positive		
Already in use	19.5	25.7
EMS will be used within the next three years	23.6	18.3
No	56.9	56.0
Neither Positive nor Negative		
Already in use	27.6	7.1
EMS will be used within the next three years	17.2	14.3
No	55.2	78.6
Negative		
Already in use	12.5	0.0
EMS will be used within the next three years	12.5	0.0
No	75.0	100.0

In response to the question 'Are environmental guidelines specified in writing in your firm?' (Questionnaire Section 4.2), 49.1% of UK SMEs compared with 37.8% of the German SMEs answered affirmatively. Formalising environmental guidelines in writing was considered by interviewed companies without an EMS to be the first major step in the direction of EMS usage. Many UK interviewees felt that EMS use would increase in much the same way that marked the advent and subsequent use of quality management systems (QMS) throughout the company size categories (Rothery 1995). Research results identified a strong relationship between EMS use and QMS ownership, particularly in the case of UK firms where all users of certified

ISO 14001 systems possessed quality management systems (Table 8.28). Statistically significant levels of UK SMEs were also identified as users of Health and Safety systems (Firms with an EMS: Health and Safety - UK - χ^2, r = 10.2, df = 1, p = 0.001; Firms with EMAS/ISO 14001: Health and Safety - UK - χ^2, r = 5.86, df = 1, p = 0.01). Significantly more UK firms used H+S Systems between the 10-249 company size categories; similar levels of Quality Management Systems were used by UK and German SMEs with the exception of the 10-49 company size category in which more UK small firms were associated with QMS use (Table 8.28: QMS Usage (10-49): UK - χ^2, r = 9.36, df = 1, p = 0.002).

Table 8.28: Management Systems

Types of Management Systems used within Firm	UK %	Germany%
All Respondents		
Quality Management System (ISO 9000 series)	78.0	50.0
Health + Safety System	45.0	15.7
In-house Developed Management System	19.3	7.0
Other Management Reporting System	8.3	7.0
None	9.2	39.5
Firms with an EMS		
Quality Management System (ISO 9000 series)	87.0	78.1
Health + Safety System	60.9	18.8
In-house Developed Management System	34.8	15.6
Other Management Reporting System	21.7	9.4
None	0.0	6.3
Types of Management Systems used within Firm (Firms with ISO 14001/EMAS)	**UK %**	**Germany%**
All Respondents		
Quality Management System (ISO 9000 series)	100.0	82.6
Health + Safety System	62.5	17.4
In-house Developed Management System	25.0	13.0
Other Management Reporting System	12.5	8.7
None	0.0	4.3
Quality Management /Health + Safety Systems (All Respondents by Company Size)	**UK %**	**Germany%**
Quality Management Systems		
1-9	-	11.5
10-49	78.6	33.9
50-99	68.8	61.3
100-249	81.3	80.0
250-500	83.3	82.6
Health + Safety Systems		
1-9	-	3.8
10-49	42.9	9.7
50-99	40.6	12.9
100-249	40.6	16.7
250-500	56.7	47.8

Appropriately detailed documentation would have the advantage of displaying the interrelations shared between environmental tasks and increase the visibility of potential problems and their possible solutions. One possible reason for the lack of detailed documentation in general and detailed environmental documentation in particular within smaller firms may be rooted in the way SMEs perceive themselves in relation to environmental problems. This view was supported by some interviewees who described their environmental pollution contributions as 'small fry' or themselves as 'not the real polluting players'. Since the profile of SMEs compared against that of larger companies is generally smaller and SMEs have traditionally escaped the attention of pressure groups, SMEs often still feel that there is less need for official documentation declaring their environmental credentials. If management and stakeholders at large perceive the environmental issues associated with smaller company production and processes are insignificant, then there is evidently less reason for such companies to immerse themselves in significant environmental policy formulation:

> "We don't see yet a big drive from our customers pushing us down that route and probably until we saw a little more of a drive would we be prompted to do it, unless of course, legislation then meant that you had to do it." **Quality Assurance Manager, Food**.

Other SMEs were keen to impress the importance of the collective responsibility they also share in pollution prevention:

> *"Der erste Satz unserer Umweltschutzleitlinien lautet: "Die Zukunft der Menschen, der Gesellschaft und der Industrie hängt vom ökologischen Gleichgewicht der Natur ab. Jeder einzelne ist daher gefordert, sein Tun in Zusammenhängen zu sehen und Verantwortung zu übernehmen", und genauso handeln wir und denken wir in dieser Firma - anders zu denken ist höchst unvernünftig, schlimmstenfalls, Selbstmord..."* (The first sentence in our environmental protection guidelines reads like this: 'The future of man, society and industry depends upon the ecological balance of nature. Therefore, everyone is encouraged to do what can be done in each situation and remain responsible for ones actions' and this is how we conduct ourselves in this firm - to think otherwise is not very sensible, and in the worst case - suicidal.) **Company Director, Chemicals**.

More than half of the firms interviewed felt that since SMEs play a significant role in both the UK and German economies, they should share some responsibility in the

environmental damage and problems associated with industrial waste. The most influential drivers of environmental protection were revealed to be environmental legislation, Company Directors in the German case and Company Managers. Social stakeholders and pressure groups, which draw attention to the implications of uncontrolled industrial activity and social production, were perceived to be less influential factors of environmental change for UK and German SMEs. Shifts in the locus of environmental protection influence can be observed between UK and German firms with and without an EMS. For UK firms without an EMS the most influential driver of environmental improvement was singularly legislation, followed by company management, whilst in German firms the most influential drivers were the Company Directors, followed by environmental legislation. UK companies with an EMS still considered environmental legislation to be the most significant driver (Table 8.29: (Firms with an EMS) Influential Driver, Legislation - UK - χ^2, $r = 3.78$, df = 1, $p = 0.05$) but the second most important influence was now the Environmental Manager/Officer, followed by the Company Director. UK SMEs with ISO 14001 considered company management followed by environmental management to be the most important influence for environmental improvement, whilst the Company Director and environmental legislation occupied the third position of responsibility. In general terms, the Company Director was identified as the most influential driver of environmental improvement in German SMEs, followed by legislation, Local Authorities and environmental management/officials. For German firms with an EMS the most important drivers were the Environmental Manager, Company Director, company management and customers, respectively. In German SMEs with EMAS/ISO 14001 Company Directors and Environmental Managers/Officials were identified as the most important influences, followed by environmental legislation and Local Authorities (Table 8.29). UK and German firms believed the embrace of environmental strategies which enhanced company performance and the natural environment also served to counter general criticism and negative publicity which might be associated with company engagements. In Table 8.30 the advantages of EMS implementation as perceived by EMS users are presented.

Company image improvements and reductions in risk liability are still held to be integral advantages of an EMS by UK and German respondents. The third most important consideration for UK respondents was the cost saving capacities secured or anticipated in addition to resource savings. Over 40% of German respondents with an EMS felt that, in addition to resource savings, improved competitive prowess, increased staff motivation, maintenance of the company market position and more environmentally-friendly products would accrue from introducing an EMS.

Table 8.29: Influential Drivers of Environmental Protection Improvement

Most influential Drivers of Environmental Protection (Firms without EMS)	**UK %**	**Germany%**
Members of Staff	5.8	17.1
Company Management	57.0	30.7
Environmental Manager/Officer	31.4	25.0
Works Council/Factor Committee	5.8	3.6
Company Directors	32.6	46.4
Suppliers	5.8	6.4
Customers	30.2	23.6
(Local) Authorities	32.6	42.9
Environmental Legislation	62.8	44.3
Other	1.2	2.1
Most influential Drivers of Environmental Protection (Firms with an EMS)		
Members of Staff	4.3	15.6
Company Management	39.1	37.5
Environmental Manager/Officer	56.5	75.0
Works Council/Factor Committee	26.1	15.6
Company Directors	47.8	68.8
Suppliers	4.3	6.3
Customers	34.8	37.5
(Local) Authorities	26.1	31.3
Environmental Legislation	60.9	34.4
Other	4.3	12.5
Most influential Drivers of Environmental Protection (Firms with ISO 14001 or EMAS)		
Members of Staff	12.5	13.0
Company Management	87.5	34.0
Environmental Manager/Officer	75.0	87.0
Works Council/Factor Committee	25.0	21.7
Company Directors	62.5	87.0
Suppliers	0.0	4.3
Customers	50.0	30.4
(Local) Authorities	12.5	39.0
Environmental Legislation	62.5	43.5
Other	0.0	8.7

Table 8.30: Advantages of EMS Implementation (Firms with EMS)

Advantages anticipated from introducing Environmental Management (Firms with EMS)	UK %	Germany%
An improved Company Image	73.9	78.1
Risk reduction in terms of Environmental Liability Legislation	78.3	71.9
Improved Competitive Prowess	17.4	46.9
Resource Saving	52.2	46.9
More Environmentally-friendly Products	17.4	40.6
Increased Staff Motivation	30.4	43.8
Greater consideration of changing Customer Demands	30.4	31.3
Maintenance of Company Market Position	34.8	43.8
Cost Savings	69.6	34.4
Other	4.3	6.3
No Advantages	0.0	3.8

Interviewees with environmental management systems associated similar benefits to EMS implementation and drew attention to general improvements in company morale and employee commitment borne out of a more intimate understanding of work practices:

> "Even though we are at the early stages of a lot of our projects we have saved money, just purely on improving the way we are managing things - that is an asset and aspect; compliance with legislation also improves relations with customers, for example, when we receive questionnaires from customers and now we can say "Here is our certificate", "We've done it" or "We're doing it" - so it's all positive" **Environmental Manager, Chemicals**.

> *"Unter den Vorteilen eines UMS zählen vor allem ... Effektivere Kommunikation wird vorangetrieben im Umweltbereich und jede Art von Dokumentation, die Arbeitserfahrung und -anweisungen werden mit Umweltangelegenheiten näher gebracht, damit Unternehmensfaktoren stärker im Fokus stehen."* (Amongst the advantages of an EMS I would list ... more effective communication is promoted in environmental activities and each form of documentation, work experience, work procedures become more closely linked to environmental affairs, so that corporate factors have a more sharply defined focus.) **Environmental Manager, Food**.

A general claim held to be true is that the active involvement of workers in the orchestration of the processes and duties of their work appreciably increases the economic performance of the firm (ASU 1998, UBA 1998). The conclusion to be drawn from this premise is that workers should be encouraged to engage in constant dialogue amongst themselves and their management in order to fully benefit from continuous improvement processes. Whilst the flexible and systematic involvement of workers in company or departmental task management amongst SMEs was not convincingly supported by UK and German SMEs in general, increased employee involvement correlated with EMS implementation (Table 8.31). One of the important factors militating against totally integrated employee involvement is the nature of management and workforce culture which can be further crystallised by particular influences within corporate culture. One of the survey findings supported by existing research was that the operational distance between management, experts and workers in the EMS development process can be fairly remote (ASU 1998, Goodchild 1998). As previously discussed, additional

channels for staff motivation during EMS implementation and project life cycles are central factors in the potential success associated with environmental system usage. Where implementing an EMS is understood as part of the company innovation process, the potential for interdepartmental and management system benefits increase accordingly (Birke and Schwarz 1997). Table 8.32 records the percentage contributions of corporate environmental actors during the development and implementation of an EMS. The cluster of main sharers for EMS and EMAS/ISO 14001 implementation or development was generally wider in UK SMEs, featuring Company Management, the Company Director, the Environmental Manager and the Quality Manager. Significantly more UK Quality Managers shared in ISO 14001 development and implementation than German Quality Managers (Table 8.32 - UK - χ^2, r = 4.84, df = 1, p = 0.02). The key cluster in German SMEs tended to be much more limited, reserved for the Company Director and Environmental Manager, although individual contributions in the environmental process were comparatively high.

The unfamiliarity of management with environmental themes necessitated the tuition of key personnel (as later described in Table 8.60). UK respondents expressed a concern that EMS formulation would be characterised by management resistance to its implementation (Table 8.33). A range of tests were conducted on the UK SME cohort to establish the degree of internal conflict during EMS implementation, however, each of these tests, including the results recorded in Table 8.33, supported the view that the potential for discord during EMS implementation was particularly pronounced. During the EMS implementation phase passive and active resistance to environmental change may surface, especially amongst power brokers, perhaps resulting from the exposure of malpractice, or far reaching organisational changes which may lead to insecurities (Meima 1997).

Table 8.31: Legal and Voluntary Corporate Environmental Engagements (Firms with an EMS/Firms with ISO 14001 or EMAS)

Legal Obligation of Firms to have an individual managing Corporate Environmental Issues (Firms with an EMS)	**UK %**	**Germany%**
Yes	56.5	56.3
No	34.8	40.6
Unsure	8.7	3.1
Does the Firm have an Environmental Programme and have Workers been assigned Environmental Responsibilities (Firms with an EMS)		
Yes	56.5	90.6
Partial	34.8	6.3
No	14.5	3.6
Does the Firm have Environmental Committee, an Environmental Team or Working Group (Firms with an EMS)		
Yes	78.3	56.3
No	21.7	43.7
Legal Obligation of Firms to have an individual managing Corporate Environmental Issues (Firms with ISO 14001/EMAS)		
Yes	62.5	74.0
No	25.0	21.7
Unsure	12.5	4.3
Does the Firm have an Environmental Programme and have Workers been assigned Environmental Responsibilities (Firms with ISO 14001/EMAS)		
Yes	75.0	100.0
Partial	25.0	0.0
No	0.0	0.0
Does the Firm have Environmental Committee, an Environmental Team or Working Group (Firms with ISO 14001/EMAS)		
Yes	87.5	60.9
No	12.5	39.1

Table 8.32: Sharers in the Development/Implementation of Environmental Management

Sharers in the Implementation of Environmental Measures in Firm (EMS Ownership)	UK %	Germany%
Company Management	82.6	62.5
Company Directors	82.6	87.5
Environmental Committee	39.1	34.4
Environmental Department	13.0	18.0
Environmental Manager/Officer	73.9	71.9
Quality Management Manager/Officer	47.8	31.3
Health and Safety Manager/Officer	65.2	50.0
Works Council/Factory Committee	43.5	21.9
Each Employee	30.4	40.6
Another	4.3	6.3
No One	0.0	0.0
Sharers in the Development/Implementation of Environmental Measures in Firm (ISO 14001 /EMAS Ownership)	**UK %**	**Germany%**
Company Management	87.5	68.2
Company Directors	75.0	100.0
Environmental Committee	62.5	34.8
Environmental Department	12.5	26.1
Environmental Manager/Officer	87.5	91.3
Quality Management Manager/Officer	75.0	30.4
Health and Safety Manager/Officer	62.5	56.5
Works Council/Factory Committee	25.0	30.4
Each Employee	25.0	52.2
Another	0.0	8.7
No One	0.0	0.0

Table 8.33: Problems with EMS Implementation

Problems envisaged in relation to EMS Implementation	UK %	Germany%
Companies without an EMS		
Problems associated with organising personnel	34.9	42.0
Conflicts with other Management Systems	20.6	9.8
Extra Work for Staff	61.9	60.7
Resistance on the part of Management	27.0	4.5
Inconvenience in the face of additional Responsibilities	39.7	8.9
Increase in company costs	60.3	76.8
Resistance on the part of Company Directors	15.9	8.9
Environmental Information and Training Needs	28.6	34.8
Opposition on the part of the workers	19.0	17.9
An overburdening Requirement to produce Information	41.3	10.7
Too limited Support from outside the Company	19.0	16.1

Table 8.33: Problems with EMS Implementation (ctd.)

Problems envisaged in relation to EMS Implementation	UK %	Germany%
Companies with an EMS		
Problems associated with organising personnel	56.5	40.6
Conflicts with other Management Systems	26.1	43.8
Extra Work for Staff	52.2	62.5
Resistance on the part of Management	30.4	18.8
Inconvenience in the face of additional Responsibilities	39.1	18.8
Increase in company costs	52.2	34.4
Resistance on the part of Company Directors	13.0	6.3
Environmental Information and Training Needs	30.4	40.6
Opposition on the part of the workers	26.1	15.6
An overburdening Requirement to produce Information	34.8	6.3
Too limited Support from outside the Company	8.7	6.3

Commentators such as Emerson and Welford (1997a) allude to both the organisational benefits derived from entrusting workers with environmental responsibilities and the impacts associated with unrequited, or limited executive attention to such workers' commitment. This was implied during an interview with a Quality Manager primarily responsible for addressing environmental affairs in his company:

> "Your firm - what could be done to promote more environmental practice?
>
> I think we need to get to a stage where the rolling down of objectives comes from the other direction - it needs to be better integrated into what are the business directives.
>
> The other direction?
>
> At the moment it tends to come from me, up to the Board and then back down again, whereas I think it should be driven the other way; but that's something that is going to have to come from the quality system anyway and once they've got that under their belt I think it will happen as a matter of cause. We're trying to do it but its not 100% successful.
>
> So you would say that in your company that it's not 'bottom-up' or 'top-down', its more 'middle-up' 'middle-down'?
>
> Yeah, some things do come down from above, but often it is me saying "we need to do this", and they will say "yes, okay, go ahead and sort something out" and not so much coming the other way, partly though it does depend upon where the identification of issues takes place, because if we look at the difference between quality and environment, on the quality side it is very much a question of the customer, it is customer driven and, therefore, information comes into the company at senior management level and then is driven down; with the environment, because there is so much due to various types of outside pressure, the information tends to flow in to the

> individual who is responsible and is then disseminated from there, so there is perhaps a natural tendency for objectives to be driven in that direction.
>
> The assumption is that the person in receipt of that information is not on the Board Level
>
> Certainly in this company that's true because they have delegated that responsibility down to me and then I feed it back into the Board fairly directly. We obviously have Environmental Management Meetings and one of the things we always talk about in those meetings is what the issues are in the next 12 months, so they are aware of it, it's just that it's going up there and then coming back down again, but I suppose that's probably a function of where the responsibility/information is in a particular company." **Quality Systems Manager, Food and Beverages**.

Problems associated with environmental management implementation are often interrelated. Personnel organisation concerns cited in Table 8.33, for example, may obliquely signal additional deficits such as 'passive' resistance on the part of management rooted in additional responsibilities or priorities.

Many interviewees held the formulation stage to be the most important since it defined the foundation of subsequent environmental engagement. Where such environmental issues are successfully resolved, the introduction of company wide environmental programmes tended to be more straightforward:

> "... Sitting down and going through all your environmental aspects; scoring them all was quite time consuming and hard work. Also implementing procedures - trying to get people to carry out procedures and training because although you can make people more aware, people are always reluctant to change what they are doing and the way they do things... We implemented it in 9 months - from start to finish, so it was quite hectic; I wouldn't have been able to complete it in that time without a consultant." **Environmental Manager, Chemicals**.

Environmental management demands executive and operational structures which enhance organisational functionality and a sensible project plan to ensure this objective is met. All interviewees agreed that environmental management should aim at enhancing organisational functionality through measures which are both transparent and acceptable. Organisational development measures which unhinge established practices and domains of control may lead to contention and resistance which may adversely impact competitive impulses of a firm. It was also felt that defined environmental modifications in an organisation must anticipate reactionary behaviour and be sufficiently pliable to accommodate resistance. The author

contends that attitudinal intricacies of corporate culture or organisational architecture are less important factors for successful management systems than the nature of dialogue during system implementation. High rates of voluntary dialogue between management and the workforce will not be a natural feature of organisational cultures where rigid *communicational* hierarchies are particularly pronounced. Organisations with flatter management architecture but strict lines of *communication* will encounter more worker or management conflicts than experienced in organisational cultures with a deeply ingrained sense of hierarchy but with functionally oriented, in contrast to procedurally-oriented lines of communication. The impact of behavioural patterns exhibited by top management tends to cascade down the employment ranks. Another factor was described as the physical number of the workforce, which if small, and especially where automated procedures strongly govern workforce activities, would render systematic collaboration between workers superfluous. In some instances the failure to meaningfully engage workers in company processes is linked to management unease of any growth of employer independence or impositions (Pautzke 1989, Meima 1997). Handy (1993) also pointed to the consequences of resource power and expertise where an individual or group possesses acknowledged and valued skill within an organisation due to formal or informal factors. These factors also determine the *right* to exercise power. Where specialists or leaders are able to demonstrate expertise and leadership, their instructions are readily implemented. Where, however, this expertise is questioned, specialists and leaders are inclined to resort to other sources of power such as status. For example, environmental reviews may expose unsatisfactory work patterns and cost factors, such as training expenses of employees, which have to be met at the price of productive time spent in work. However, from a management perspective the ensuing cost benefits may be singularly abstract, ie, the application of new knowledge to tasks at work, which are not perceived as translating into marked productivity improvements (Meima 1997).

Both questionnaire results and interview dialogues emphasised that implementing environmental management in SMEs requires the full commitment of top management who should be primarily responsible for creating the operational and organisational climate which will accommodate environmental management. Where the Managing Director orchestrated environmental plans and programmes the functional roles between management and 'subordinates' were less likely to be misunderstood and accepted by both parties (Table 8.34). The importance of the orchestrating role of top management in environmental affairs was articulated by a UK Company Director who contributed to an interview held with an Environmental Manager and Health and Safety Manager:

> "It's very simple. If we, the Company Management Team, do not lead, who is leading and how? And on top of that, nobody argues with us do they [laugh]!" **Company Director, Printing**.

Where various forms of environmental management conflict may exist (Table 8.34: Inconvenience in the face of additional responsibilities - UK - χ^2, r = 11.05, df = 1, p = 0.0008; An overburdening requirement to produce information - UK - χ^2, r = 18.03, df = 1, p = 0.00002) top management commitment more effectively offsets potential discord. The following quotation, albeit an example of perhaps common 'soft' environmental encounters, does serve to illustrate cultural dissonance, where espoused values fail to accord with actual commitment:

> "I wouldn't say that we have had environmental conflicts as such but there are niggling things that perhaps create tension between staff and management. I'll give you an example: Last year after an Environmental Review we tightened up our safety procedures by introducing a few changes including a ban on using the forklift truck stretch as a short cut to the toilets. Now everybody agreed that was a sensible safety idea. But you wouldn't believe the grief we've had maintaining that code - and there are many other situations like that... " **Health and Safety Manager, Packaging**.

Table 8.34: Problems with EMS Implementation (Accounting for Company Directors who are 'Influential Drivers in Environmental Protection Improvement' and 'Sharers in EMS Implementation/Development)'

Problems envisaged in relation to EMS Implementation (Company Directors' Response)	UK %	Germany%
Problems associated with organising personnel	51.6	41.9
Conflicts with other Management Systems	22.6	27.0
Extra Work for Staff	71.0	60.8
Resistance on the part of Management	16.1	8.1
Inconvenience in the face of additional responsibilities	45.2	14.9
Increase in company costs	38.7	58.1
Resistance on the part of Company Directors	3.2	4.1
Environmental Information and Training Needs	35.5	28.4
Opposition on the part of the workers	22.6	16.2
An overburdening Requirement to produce Information	48.4	10.8
Too limited Support from outside the Company	12.9	16.2
Other Problems	3.2	0.0
No Problems envisaged	0.0	6.8

Table 8.35: Environmental Factors

Factor 8.1	Loading
Description: 'Ecological Orientation'	
Environmentally-oriented Transport (of raw materials)	0.66090
Creating environmentally suitable products	0.69469
Ecological product development	0.75956
Environmentally sensitive purchasing	0.62389
Factor 8.2	
Description: 'Environmental Control'	
Improving the environmental practices of contractors/suppliers	0.55207
Preventing and restricting environmentally-damaging accidents /disturbances (providing danger safeguarding mechanisms)	0.54723
Improving technical equipment	0.57929
Reinforcing control of environmentally relevant activities	0.69199
Factor 8.3	
Description: 'Production Process Change'	
Changing existing production processes	0.81676
Introducing new production processes	0.84227
Factor 8.4	
Description: 'Environmental Efficiency'	
Energy saving and improving energy efficiency	0.59856
Reuse of waste materials	0.73573
Avoidance/Minimisation of Waste	0.69811
Water and effluent reduction	0.53651
Factor 8.5	
Description: 'Water and emissions Control'	
Water and effluent reduction	0.62593
Dealing with water-damaging substances	0.81871
Control and reduction of emissions	0.62389

Table 8.36: Important Corporate Measures (Ecological Orientation)

Environmentally-oriented Transport	**UK %**	**Germany%**
Chemicals, Rubber and Plastic	28.1	56.8
Machinery	27.0	41.7
Pulp, Paper and Packaging	28.6	54.5
Food and Beverages	36.8	62.9
Creating Environmentally-suitable Products		
Chemicals, Rubber and Plastic	50.0	63.6
Machinery	32.4	46.7
Pulp, Paper and Packaging	42.9	63.6
Food and Beverages	42.1	71.4
Ecological Product Development		
Chemicals, Rubber and Plastic	31.1	54.5
Machinery	32.4	38.8
Pulp, Paper and Packaging	14.3	51.5
Food and Beverages	26.3	54.3
Environmentally Sensitive Purchasing		
Chemicals, Rubber and Plastic	37.5	68.2
Machinery	32.4	56.7
Pulp, Paper and Packaging	33.3	57.6
Food and Beverages	52.6	71.4

In Section 4.3 of the research questionnaire respondents were asked to assess the importance of a range of company measures. On the basis of the claims of UK and German respondents five factors in Table 8.35 were identified and the responses associated with these factors considered in the context of industry sectors. Table 8.36 indicates a larger percentage of German respondents claimed activities associated with 'ecological orientation' (Factor 8.1) were currently of importance to their firm. With the exception of respondents in the Machinery sector, over 50% of German respondents considered strategies for the development of environmentally oriented Transport (of raw materials) were important. In the context of ecologically oriented activities the most important target pursued by the majority of UK respondents was creating environmentally suitable products followed by environmentally sensitive purchasing. Table 8.36 reveals respondents from the UK and German Food industry were particularly keen to adopt ecologically oriented strategies and respondents from the Machinery sector the least committed to such measures.

Table 8.37 indicates that prevention and restriction of environmentally damaging activities and improving technical equipment were the most important 'environmental control' measures for UK and German firms (Factor 8.2). Production process change (Factor 8.3) through modification of existing or the introduction of new techniques and technology was not considered to be important for German respondents generally and specifically not a priority for the Machinery sector (Table 8.38).

More German than UK SMEs in each industry sector described dealing with water-damaging substances and water and effluent reduction as important corporate environmental measures. UK and German firms primarily focused on environmental measures which facilitated material and cost savings. With the exception of respondents from the German pulp, paper and packaging sector over 80% of all responding firms believed increasing energy saving and efficiency beyond current levels was important, whilst waste minimisation strategies and measures to reuse what would traditionally be regarded as waste (Factor 8.4) was a key concern of all firms, with the exception of those in the Machinery sector.

Table 8.37: Important Corporate Measures (Environmental Control)

Preventing and Resisting Environmentally-damaging Accidents and Disturbances	**UK %**	**Germany%**
Chemicals, Rubber and Plastic	87.5	77.3
Machinery	78.4	68.3
Pulp, Paper and Packaging	71.4	75.8
Food and Beverages	84.2	74.3
Improving the Environmental Practices of Contractors and Suppliers		
Chemicals, Rubber and Plastic	40.6	40.9
Machinery	35.1	18.3
Pulp, Paper and Packaging	23.8	30.5
Food and Beverages	47.4	42.9
Improving Technical Equipment		
Chemicals, Rubber and Plastic	75.0	70.5
Machinery	54.1	71.1
Pulp, Paper and Packaging	57.7	68.4
Food and Beverages	78.9	77.1
Reinforcing Control of Environmental Activities		
Chemicals, Rubber and Plastic	59.4	70.5
Machinery	51.4	45.0
Pulp, Paper and Packaging	33.3	34.4
Food and Beverages	57.9	57.1

Table 8.38: Important Corporate Measures (Production Process Change)

Changing Existing Production Processes	**UK %**	**Germany%**
Chemicals, Rubber and Plastic	56.3	31.3
Machinery	35.1	35.0
Pulp, Paper and Packaging	61.9	36.4
Food and Beverages	52.6	48.6
Introducing New Production Processes		
Chemicals, Rubber and Plastic	56.3	38.6
Machinery	37.8	40.0
Pulp, Paper and Packaging	42.9	54.5
Food and Beverages	73.7	48.6

Table 8.39: Important Corporate Measures (Water and Emissions Control)

Water and Effluent Reduction	**UK %**	**Germany%**
Chemicals, Rubber and Plastic	59.4	68.2
Machinery	56.8	80.0
Pulp, Paper and Packaging	57.1	63.6
Food and Beverages	78.9	91.4
Control and Reduction of Emissions		
Chemicals, Rubber and Plastic	84.4	61.4
Machinery	62.2	60.0
Pulp, Paper and Packaging	61.9	66.7
Food and Beverages	63.2	71.4
Dealing with Water-Damaging Substances		
Chemicals, Rubber and Plastic	38.1	70.5
Machinery	47.4	80.0
Pulp, Paper and Packaging	43.8	75.8
Food and Beverages	45.9	68.6
Environmental Efficiency:		
Energy Saving and Energy Efficiency	**UK %**	**Germany%**
Chemicals, Rubber and Plastic	96.9	86.4
Machinery	83.8	88.3
Pulp, Paper and Packaging	85.7	75.8
Food and Beverages	89.5	88.6
Reuse of Waste Materials		
Chemicals, Rubber and Plastic	90.6	84.1
Machinery	40.5	65.0
Pulp, Paper and Packaging	85.7	75.8
Food and Beverages	89.5	88.6
Avoidance/Minimisation of Waste		
Chemicals, Rubber and Plastic	96.9	88.6
Machinery	75.7	80.0
Pulp, Paper and Packaging	90.5	81.8
Food and Beverages	89.5	80.0
Water and Effluent Reduction		
Chemicals, Rubber and Plastic	59.4	68.2
Machinery	56.8	80.0
Pulp, Paper and Packaging	57.1	63.6
Food and Beverages	78.9	91.4

Interview data exhibited five conditional factors or cultural drivers which, it is argued, favourably influence environmental management consequences. These EMS cultural drivers correspond with eight variables in Questionnaire Section 4.1. Institutionalisation factors identified through the questionnaire and interview processes served to contextualise the analysis of corporate and cultural influences on environmental action. In Table 8.40 corporate and cultural factors drawn from interviews and corresponding questionnaire culture variables are presented.

Table 8.40: Corporate and Cultural Factors on Environmental Action

Interview Factors	Questionnaire Equivalents
Relevant training and skills acquisition	High regard for company training
Positive staff climate	(i) Motivated and committed staff
	(ii) Open company culture
Environmental/ecological sensitivity	(i) Creating environmentally suitable products
	(ii) Ecological product development
	(iii) Environmentally sensitive purchasing
Cost saving orientations	Energy saving and energy efficiency
Environmental liability reduction	Environmental damage prevention

Tables 8.40 to 8.45 present the main statistical analysis of corporate and cultural influences on EMS implementation. Three broad conclusions can be drawn from the analysis of these corporate values:

(i) Companies which placed a high value on regular training of their staff, the maintenance of a thoroughly committed workforce or where companies were characterised by an open, informing work culture were less likely to experience management related conflicts when introducing an EMS. The percentage of SMEs which considered regular and relevant training of staff to be 'very important' accounted for approximately 5% of total responding UK and German firms. The percentage of German firms in which the claim was made it is 'very important' that almost all employees were interested in possible ways to improve their firm was

marginally over 10%, as was the percentage of UK firms in which the claim was made it was 'very important' that all employees were kept well informed about important future developments in their firm. Of the three variables 'Training' was the most closely associated with the use of a certified or verified EMS. Firms which considered these cultural characteristics to be either 'very important' or important' represented over 50% of the total percentage of certified and verified environmental management system owners; German firms with an open informing culture represented 91.7% of all German firms with ISO 14001 (Table 8.41).

(ii) Companies which considered the pursuit of ecologically sensitive strategies to be very important represented less than 10% of all UK responding firms and less than 15% of responding German firms. In the case of UK firms these cultural variables were not closely associated with a reduction in conflict during EMS implementation and broadly similar firm percentages which held these corporate pursuits to be 'very important' or 'important' had certified or verified environmental management systems (Table 8.42). Considered together SMEs, which felt that creating environmentally suitable products, ecological product development and environmentally sensitive purchasing was 'very important', were not identified with more certified or verified environmental management systems. However, a looser definition of the ecologically sensitive cohort, which accommodated all companies where one of the three corporate culture variables was held to be either 'very important' or 'important', accounted for all of the verified and certified EMAS and ISO 14001 systems (Table 8.43).

(iii) The pursuit of 'energy saving/improving energy efficiency' and 'environmental damage protection' without the modulating influences of 'relevant and regular training', a 'fully integrated workforce' and 'an open corporate culture' increased the likelihood of encountering conflict when implementing an EMS. Yet data analysis revealed these corporate culture factors to be singularly important for the embrace of environmental management systems. Firms which pursued an energy efficiency

strategy or an environmental damage prevention strategy were more closely associated with the use of a certified or verified environmental management system than firms exclusively pursuing an ecological strategy (Tables 8.44 and 8.45).

Table 8.41: Training, Motivation and Openness

	UK %	Germany%
All Employees must regularly attend training courses in their area of work (Very Important)	5.4	5.2
EMS already in use	33.3	33.3
EMS will be in place within three years	33.3	33.3
EMAS verification	0.0	22.2 (9.5)
ISO certification	33.3 (25.0)	33.3 (25.0)
EMS implementation accompanied with management resistance	0.0	0.0
All Employees must regularly attend training courses in their area of work (Very Important/ Important)	31.8	30.8
EMS already in use	22.9	37.7
EMS will be in place within three years	31.4	28.3
EMAS verification	0.0	26.4 (66.7)
ISO certification	14.3 (62.5)	17.0 (75.0)
EMS implementation accompanied with management resistance	17.1	5.7
	UK %	**Germany%**
Almost all employees are interested in possible ways to improve our firm (Very Important)	5.4	12.2
EMS already in use	33.3	14.3
EMS will be in place within three years	0.0	14.3
EMAS verification	0.0	4.8 (4.7)
ISO certification	0.0	0.0
EMS implementation accompanied with management resistance	0.0	0.0
Almost all employees are interested in possible ways to improve our firm (Very Important/ Important	45.4	63.9
EMS already in use	30.0	21.8
EMS will be in place within three years	18.0	20.0
EMAS verification	0.0	12.7 (67.7)
ISO certification	12.0 (75.0)	6.4 (58.3)
EMS implementation accompanied with management resistance	18.0	4.5

Table 8.41: Training, Motivation and Openness, (ctd.)

	UK %	Germany%
All employees are kept well informed about important future developments in our firm (Very Important)	11.8	7.5
EMS already in use	30.8	23.1
EMS will be in place within three years	38.5	7.7
EMAS verification	0.0	15.4 (9.5)
ISO certification	7.7 (0.9)	15.4 (1.1)
EMS implementation accompanied with management resistance	7.7	0.0
All employees are kept well informed about important future developments in our firm (Very Important/Important)	54.5	53.4
EMS already in use	26.7	25.0
EMS will be in place within three years	21.7	19.6
EMAS verification	0.0	15.2 (66.7)
ISO certification	10.0 (75.0)	12.0 (91.7)
EMS implementation accompanied with management resistance	18.3	5.4

Table 8.42: Environmental and Ecological Orientation

	UK %	Germany%
Creating environmentally suitable products (Very Important)	9.0	14.5
EMS already in use	30.0	20.0
EMS will be in place within three years	30.0	16.0
EMAS verification	0.0	12.0 (14.2)
ISO certification	0.0	12.0 (25.0)
EMS implementation accompanied with management resistance	30.0	0.0
Creating environmentally suitable products (Very Important/Important)	40.9	59.3
EMS already in use	28.9	20.6
EMS will be in place within three years	22.2	21.6
EMAS verification	0.0	13.7 (66.7)
ISO certification	13.3 (75.0)	7.8 (66.7)
EMS implementation accompanied with management resistance	31.1	3.9

Table 8.42: Environmental and Ecological Orientation (ctd.)

	UK %	Germany%
Ecological product development (Very Important)	7.2	11.0
EMS already in use	50.0	15.8
EMS will be in place within three years	25.0	21.1
EMAS verification	0.0	10.5 (9.5)
ISO certification	0.0	10.5 (16.7)
EMS implementation accompanied with management resistance	50.0	0.0
Ecological product development (Very Important/Important)	27.2	48.2
EMS already in use	33.3	24.1
EMS will be in place within three years	26.7	22.9
EMAS verification	0.0	14.5 (57.1)
ISO certification	6.7 (25.0)	8.4 (58.3)
EMS implementation accompanied with management resistance	23.3	2.4
Environmentally sensitive purchasing (Very Important)	2.7	13.3
EMS already in use	33.3	26.1
EMS will be in place within three years	66.7	21.7
EMAS verification	0.0	21.7 (23.8)
ISO certification	0.0	8.7 (9.5)
EMS implementation accompanied with management resistance	33.3	0.0
Environmentally sensitive purchasing (Very Important/Important)	37.2	62.7
EMS already in use	24.4	23.1
EMS will be in place within three years	29.3	19.4
EMAS verification	0.0	14.8 (76.1)
ISO certification	9.8 (50.0)	8.3 (75.0)
EMS implementation accompanied with management resistance	22.0	5.6

Table 8.43: Clustered Environmental and Ecological Orientation

	UK %	Germany%
Creating environmentally suitable products and Ecological product development and Environmentally sensitive purchasing (Very Important)	0.9	6.3
EMS already in use	0.0	18.2
EMS will be in place within three years	100.0	27.3
EMAS verification	0.0	18.2 (9.5)
ISO certification	0.0	9.1 (8.3)
EMS implementation accompanied with management resistance	0.0	0.0
Creating environmentally suitable products and Ecological product development and Environmentally sensitive purchasing (Very Important/Important)	17.2	37.2
EMS already in use	26.3	25.0
EMS will be in place within three years	26.3	23.4
EMAS verification	0.0	14.1 (42.8)
ISO certification	5.3 (12.5)	6.3 (33.3)
EMS implementation accompanied with management resistance	15.8	1.6
	UK %	**Germany%**
Creating environmentally suitable products or Ecological product development or Environmentally sensitive purchasing (Very Important)	56.3	75.0
EMS already in use	25.8	20.9
EMS will be in place within three years	27.4	19.4
EMAS verification	0.0	14.0 (85.7)
ISO certification	9.7 (75.0)	8.5 (91.6)
EMS implementation accompanied with management resistance	17.1	5.7
Creating environmentally suitable products or Ecological product development or Environmentally sensitive purchasing (Very Important/Important)	90.0	98.2
EMS already in use	22.0	18.9
EMS will be in place within three years	22.0	16.6
EMAS verification	0.0	12.4 (100.0)
ISO certification	8.0 (100.0)	7.1 (100.0)
EMS implementation accompanied with management resistance	27.4	6.2

Table 8.44: Energy Saving and Damage Control Orientation

	UK %	Germany%
Energy Saving and improving energy efficiency (Very Important)	35.4	38.9
EMS already in use	23.1	25.4
EMS will be in place within three years	23.1	19.4
EMAS verification	0.0	20.9 (66.7)
ISO certification	7.7 (37.5)	10.4 (58.3)
EMS implementation accompanied with management resistance	30.8	6.0
Energy Saving and improving energy efficiency (Very Important/Important)	88.1	85.4
EMS already in use	20.6	18.4
EMS will be in place within three years	22.7	18.4
EMAS verification	0.0	13.6 (95.2)
ISO certification	8.2 (100.0)	7.5 (91.6)
EMS implementation accompanied with management resistance	26.8	6.8
	UK %	**Germany%**
Preventing Damaging Accidents Very Important	26.3	26.1
EMS already in use	34.5	24.4
EMS will be in place within three years	20.7	20.0
EMAS verification	0.0	17.8 (38.0)
ISO certification	3.4 (12.5)	15.6 (58.3)
EMS implementation accompanied with management resistance	17.2	2.2
Preventing Damaging Accidents Very Important/ Important	80.0	73.2
EMS already in use	26.1	20.6
EMS will be in place within three years	22.7	17.5
EMAS verification	0.0	13.5 (80.9)
ISO certification	9.1 (100.0)	8.7 (91.7)
EMS implementation accompanied with management resistance	28.4	7.1

Table: Table 8.45: Clustered Energy Saving and Damage Control Orientation

	UK %	Germany%
Energy Saving and improving energy efficiency or Preventing Damaging Accidents Very Important/Important	95.4	94.1
EMS already in use	21.9	19.8
EMS will be in place within three years	21.9	17.3
EMAS verification	0.0	13.0 (100.0)
ISO certification	7.6 (100.0)	7.4 (100.0)
EMS implementation accompanied with management resistance	27.6	6.8

8.2.3.1 Company Studies

Three company interviews with users of certified and verified environmental management systems are now presented in the form of company studies. Following a description of company activities and production processes, key environmental impacts of these companies are outlined. The environmental management programmes conducted within these firms to address these environmental impacts are described in order to illustrate:

(i) the relation between corporate orientations, cultural values and environmental action;

(ii) the aims of and benefits derived from environmental system development and implementation.

8.2.3.1.1 Company Alpha

Company Alpha is a brewery originally founded in 1869. Since the 1960s the company has concentrated on the production and sale of *Kölsch* beers. One of the important challenges facing this medium-sized company with 210 employees is the promotion of the culture and variety of *Kölsch* beers without compromising their traditional character. Two years before introducing EMAS Company Alpha implemented the quality management system ISO 9002.

8.2.3.1.1.1 Production Process (Company Alpha)

Malt is fed via sieves into a mill and the mill grinds the malt into a grist, which is fed into a mash-tun, along with hot water. The resulting liquid mash is collected in two vessels (decoction systems), whilst the mashing process is aided by a stirring device. Another vessel called a lauter tun is employed to clarify the mash, whereby rotating blades thin the mash substance so that the maximum amount of liquid can pass through the holes in the base. The clarified liquid, known as wort, is in turn passed to the brew-kettle. Hops are added to the wort and then the substance is boiled. After this brewing process the hops are removed through a hop extractor and the wort passes through a device called a whirlpool, which separates unwanted

proteins from the brewed wort by centrifugal force. The wort is then passed through a cooler so that it can be brought to a temperature suitable for fermentation, which takes place after yeast is added to the wort. After its period of (primary) fermentation the wort is passed to conditioning tanks where it is allowed to mature. The mature beer is then passed through a filter and following filtration the beer is retained in a holding tank, after which point it leaves the brewery either in a cask or bottle.

Table 8.46: 12-month Material Input-Output Analysis (Company Alpha)

INPUTS		OUTPUTS	
Primary Raw Materials	**Units of Measurement**	**Products**	**Units of Measurement**
Water	267,330.00 t	Beer Output	56,838.50 t
Malt	8,040.00 t	comprising:	
Hops	3.20 t	Bottle Beer	50.8%
externally brewed Beer	19,716.60 t	Cask Beer	47.6%
		Tank Beer	1.6%
Secondary Materials		**Waste/Effluent**	
Kieselguhr	113.60 t	Draff	8,529.50 t
Stabilisers	33.90 t	Spent Hopps	1,777.00 t
Labelling	64.20 t	Glass	85.81 t
Crown Corks	105.30	Kieselguhr	294.00 t
Lime	15.00 t	Particles/Dust	9.50 t
		Labelling	104.40 t
Working Materials		Household/ Domestic Waste	126.10 t
Cleansing Agents and Disinfectants	471.30 t	Building Debris	23.40 t
CO_2	202.00 t	Paper	28.87 t
		Scrap Metal	2.23 t
Energy		Wooden Pallets	2.00 t
Natural Gas	10,508 MWh	Chemicals	1.86 t
Heating Oil	1,097 MWh	Hazardous Waste	5.29 t
Electricity	4,052 MWh	Effluent	189,804.00 t

Table 8.47: Waste Statistics (Company Alpha)

Waste Statistics	**%**
Recycled	98.60
Non-recycled	1.40
Recycled Waste	**%**
Draff	78.90
Spent Hopps	16.20
Kieselguhr	2.70
Non-recycled Waste	**%**
Domestic Waste	81.45
Debris	15.11
Hazardous Waste (varnish, paint, oil, fluorescent tubes, etc)	3.40
Miscellaneous	**%**
(Damaged) Labelling	1.00
Glass	0.80
Paper	0.26
Finishers	0.10
Other Items	0.04

8.2.3.1.1.2 Environmental Impacts (Company Alpha)

Breweries tend to record high levels of electricity usage since beer needs to be cooled to the required temperature and then pumped into beer casks and bottles. Despite changes made in the refrigeration plant along with the installation of new compressors and ventilation equipment the energy consumption at Company Alpha remained constant during the three years preceding EMAS implementation, namely, at a level of 7.1 kilowatt-hours per hectolitre (kW-hr/hl). The initial company electricity consumption target post EMAS implementation is also a level no greater than 7.1 kW-hr/hl. Since introducing a 24-hour wort boiler Company Alpha has been able to reduce the energy in heat processes by 60% of that required in a conventional boiler. This is the reason why their heat consumption levels currently stand at 21.0 kW-hr/hl, described as considerably lower than the sector average. It is claimed that using gas steam boilers not only had the effect of reducing energy consumption but reducing SO_2 emissions from 35.2 tonnes to 0.4 tonnes over a period of 4 years. In order to further improve both energy and heat management within the company as a whole an assessment is due to be conducted on the economic benefits of introducing combined heat and power (CHP) technology (Table 8.46).

In many breweries the total cost of water supply and effluent disposal is equivalent to the site's energy bill. Additional costs accrue as a natural consequence of water treatment, effluent treatment and cleaning installations, casks, kegs and bottles. Company Alpha described their water use as being lower than the industry average which stood at 6 hl/hl in similar sized breweries. Optimised production processes preceding EMS implementation enabled the company to lower their water use in relation to beer sales to 4.7 hl/hl and aim to reduce water use to 4.6 hl/hl post EMS implementation. Equally, planned modifications to post EMS production processes aim at reducing levels of slurry produced from 5.8% to 5.5%, thereby making savings on water use, malt and energy consumption (Tables 8.46 and 8.48).

The amount of waste recycled as a percentage of waste produced stands at 98.6% (Table 8.47). This high recyclate percentage is possible given that 97.8% of waste at Company Alpha is organic or plant based, such as spent draff, yeast and malt. These materials are received by local agricultural companies and foodstuff producers whilst other waste such as kieselguhr is also treated for recycling. Waste glass and paper are separated into waste streams in accordance with *KrW-/AbfG* and Green Dot obligations of Company Alpha. Future plans to improve their waste statistics include exclusive use of high volume and reusable packaging (Table 8.48).

8.2.3.1.1.3 Environmental Management (Company Alpha)

Company Alpha described active environmental protection as beginning with the selection of raw materials. Water is extracted from a company-owned well, the water quality of which is subject to ongoing analysis in the brewery laboratory and independent institutes to maintain the highest reputation of the product. Equally rigorous quality checks are applied to the selection of barley and hops in addition to yeast and fermentation processes in order to secure the particular flavours characterising the range of its beers.

The quality policy of the firm was described as providing the basis for the logical development of an environmental management system defined by EMAS. It is felt that securing and promoting product quality is not conceivable without accounting for environmental aspects, especially in view of what was described by the Company Environment Protection Officer as "the intimate relationship between beer production and the earth's natural resources" (translation). Consequently this company interprets environmental protection as having a deeper meaning than simply legislative conformance. The aim of Company Alpha is to achieve economic success through applied corporate attention to all relevant environmental processes and procedures in the context of company-wide continuous

improvement. Company environmental management focuses on achieving the following five objectives:

(i) Defence and promotion of employee interests;

(ii) Protection and care of natural resources;

(iii) Minimisation and avoidance of water pollution;

(iv) Waste avoidance and waste reduction;

(v) Minimisation and avoidance of emissions.

In order to meet these objectives Company Alpha has appointed a Company Environment Protection Officer who is responsible for the definition and implementation of an environmental management system as illustrated in Figure 8.1. Other tasks performed by the Company Environmental Protection Officer include coordinating all environmental activities and extending the scope of the EMS through the provision of training and information. Additional environmental officers have been appointed to support the activities of the Environment Protection Officer. These officers assist in the effective development of environmental programmes and accommodate methods of improvement suggested by employees. The Hazardous Materials Officer is responsible for ensuring employees handle hazardous materials in accordance with legal requirements and providing related advice. The Hazardous Materials Officer is also responsible for ensuring storage conditions and practice are safe. The Waste Officer is concerned with quantifying the company waste balance, ensuring company waste gathering strategies are efficient, reducing packaging waste and increasing the level of reusable packaging utilised by the company. The Fire Protection Officer aims at guaranteeing employees are fully familiar with fire procedures in addition to maintaining emergency fire protocols and equipment. The Emissions and Water Protection Officers are concerned with all corporate matters related to the impact of emissions and water legislation. Health and Safety personnel maintain and improve safety practices at work through introducing health and safety measures and advising the workforce in such matters (Figure 8.1).

In addition to providing their customers high quality products and service Company Alpha also described customer satisfaction as involving an appreciation of environmental factors which impact all areas of corporate enterprise. The environmental system supports the joint interests of employees and employers alike and presents environmentally relevant corporate processes in a transparent way. The interplay between operational and strategic elements of this management system was also described as contributing to the continuous improvement of company performance.

Company Alpha has thus far promoted company-wide commitment to environmental improvement by maximising the potential of its staff through training and its preparedness to seriously consider all ideas aimed at improving company practice. In this respect the Company claimed to be guided by the following five environmental policy objectives:

(i) Maintaining appropriate and up-to-date documentation of all environmental programmes, targets, practices and progress.

(ii) Extending environmental policy formation, which is primarily the responsibility of company management, to each member of the company.

(iii) Emphasising the importance of company environmental protection as a personal issue. Therefore, each company member should exercise the right to question and suggest methods of improving company environmental performance.

(iv) Providing regular information and training to promote environmentally conscious thinking and action. Environmental officers with defined health and safety, fire, emissions, water management, hazardous materials and waste management responsibilities need to represent and should be approached by all members of staff for the conveyance of ideas and information. It has also been the responsibility of such environmental officers to provide all employees operational guidance.

(v) Emphasising continuous dialogue within and without the firm encourages trust and acceptance. Company Alpha has maintained its communication with its

employees and the public through environmental fora and the publication of environmental information which can be accessed by all interested parties.

Figure 8.1: Organisation Chart (Company Alpha)

Table 8.48: Environmental Programme (Company Alpha)

EMS Implementation Schedule	Environmental Measure	Responsible
	Employee Protection and Investment	
4 months prior implementation	Instructing/Training Supporting Environmental Officers	Chief Env. Officer
month of implementation	Introducing connecting Pipeways between the Chemical Storage Area and individual departments (*Aim: Minimising internal transport of cleansing agents and disinfectants*)	Company Director
1 month after implementation	Optimising the refrigeration plant through a voluntary externally verified safety check (*Aim: Heightening environmental protection for all individuals in the immediate neighbourhood and employees*)	Company Director
2 months after implementation	First Aid Training of Staff; Training additional Safety Officers	Health and Safety Personnel
5 months after implementation	Training Respiratory Protection Staff	Health and Safety Personnel
8 months after implementation	Health and safety training for company management	Health and Safety Personnel
8 months after implementation	Sign posting all pipe and pathways in the company	Machine Manager
	Resource Conservation	
1 month prior implementation	Introducing spray guns to all spray pipes	Company Director
1 month after implementation	Installing a cooling system for the ammonia compressors	Machine Manager
4 months after implementation	Recycling waste water produced washing casks and kegs for the (pre-) rinse of casks and kegs	Machine Manager
4 months after implementation	Optimising the cleaning processes (*Aim: Reducing specific water use to 4.6 hl/hl of beer sold*)	Brewing Manager
9 months after implementation	Optimising product processes, improving discharge management during brewing phases (*Aim: lowering slurry levels from 5.8% (current) to 5.5% (next year), to 5.0% (following year)*)	Brewing Manager
9 months after implementation	Feasibility study on the impacts of introducing CHP technology	Company Director
32 months after implementation	Introducing procedural changes to the South Building (*Aim: saving energy throughout the whole company*)	Company Director
32 months after implementation	Conducting beer filteration without kieselguhr (*Aim: resource savings*)	Company Director

Table 8.48: Environmental Programme (Company Alpha) (ctd.)

EMS Implementation Schedule	Environmental Measure	Responsible
	Effluent	
8 months after implementation	Extending the effluent neutralisation installation (*Aim: continued and safe maintenance of effluent emission levels*)	Company Director
32 months after implementation	Changing to environmentally-friendly cleansing agents and disinfectants, reducing the use of cleansing agents and disinfectants (*Aim: reducing levels of effluent*)	Company Director
	Waste Avoidance	
2 months after implementation	Purchase of reusable packaging for primary, secondary and working materials; crown corks, labels, kieselguhr (*Aim: reducing waste disposal by 5%*)	Sales Manager
	Emissions	
month of implementation	Introducing noise reducing equipment to: Suction pipe of the CO_2 Extractor, and the Depressuriser in the Fermenting Cellar	Machine Manager
month of implementation	Developing a concept for noise reducing measures during bottle and cask filling	Health and Safety personnel
32 months after implementation	Building a Full- and Empties Hall (reducing internal transport by approx. 2000 vehicle movements) (*Aim: Additional reduction in air emissions*)	Company Director
	Fire Protection and Emergency Procedures	
2 months after implementation	Formulation of an improved Fire Action Plan and conducting Emergency Procedures Exercises (*Aim: institutionalising emergency procedures and minimising environmental risks*)	Company Director
	Other Issues	
19 months after implementation	Integration of Quality and Environmental Management Systems	Company Director

8.2.3.1.2 Company Beta

Company Beta offers printing and publishing services with emphasis on the production of the widest range of printed products. Company Beta has thirty-two (32) employees who are predominantly involved in print production activities. Although offset printing processes are almost exclusively used, requests for letterpress printing are also accommodated. Administration and production is conducted on the ground floor of the company building whilst printed products and chemicals are packed and stored in the basement. Other activities conducted in the basement include film development and bookbinding.

8.2.3.1.2.1 Production Process (Company Beta)

The first step in the production of printed material using offset printing processes is offset plate making[140]. After the production of the print plates the image is photographed on a lithoplate through a screen and transferred onto film. The films are then moved to the assembly department where they are placed on transparent assembly sheets in preparation for printing. Offset printing involves a technique whereby the printing and non-printing of elements form part of a single surface. The printing elements of the surface repel water when moistened but absorb ink with an oil base whilst the non-printing areas absorb the water and repel the ink. The printing process is indirect in that the printed image is not transferred directly from the printing plate to the paper but is primarily transferred to a rubber blanket and then onto paper.

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[140] Various kinds of plates and processes exist depending upon the work they are intended for. Monometal plates are made of a metal with hydrophilic properties (such as zinc, aluminium, stainless steel, chromium and nickel) the surface of which is treated to make it more porous. The plate is coated with a thin layer of a photosensitive substance, covered with a negative of the texts and previously screened photographic illustrations, and exposed to intense light. This hardens the photosensitive substance in the areas of the negative where the light passes through. The photosensitive substance is then washed away from the non printing areas where the metal became wet and the hardened photosensitive substance is inked. Bimetal or trimetal plates are composed of two superimposed metals, one of which is hydrophilic and the other ink-receptive (copper, bronze) or oleophilic where the ink has an oil base. Whichever of the two covers the other in a microscopic film is partly eliminated by the photoengraving operation. In the case of hydrophilic metal, photoengraving is carried out using positives of the texts and illustrations. In the opposite case, negatives are used. Bimetal and trimetal plates are very durable and can be used to produce as many as 500,000 copies.

8.2.3.1.2.2 Environmental Impacts (Company Beta)

Table 8.49 provides an overview of material input and output flows of Company Beta in the course of a year. The use of primary, auxiliary and working materials is essentially prescribed by the production process, therefore, opportunities for material reduction were described as limited. Company Beta believed the most effective way of limiting the negative environmental impacts of its input materials was through material substitution.

Table 8.49: 12-month Material Input-Output Analysis (Company Beta)

INPUTS		**OUTPUTS**	
Materials	**Units of Measurement**	**Products**	**Units of Measurement**
Paper	400,000 kg	Print Materials	260,000 kg
Printing Ink	547 kg	**Waste**	
Auxiliary Material	1,219 kg	Waste Paper	140,000 kg
Working Materials	5,238 kg	Other Paper related Materials	27,250 kg
Packaging	25,000 kg	Special Wastes	2,200 kg
		Domestic Waste	105 m^3
Water		**Effluent**	
Drinking Water	1,074 m^3	Effluent	1,038 m^3
Energy		**Energy Consumption**	85.81 t
Electricity	117,320 kW-hr	Air emissions	-
Natural Gas	222 kW-hr		
Heating	187,530 kW-hr		
Fuel	115,640 kW-hr		
Air	-	Air Emissions	-

The largest input materials in Company Beta have been paper followed by printing ink. Virgin and recycled paper production exert pressures on the physical environment through the use of natural resources such as wood, energy and the production of toxic emissions. The company aims to minimise paper use by improving its production processes to encourage less reject copies and economic use of paper (Table 8.50). As a consequence of using ink, solvents are unavoidably released to the air as volatile organic compounds (VOC) but offset printing ink used by Company Beta has significantly reduced the direct use of solvents and VOC emissions.

Table 8.50: Waste Statistics (Company Beta)

INPUTS		OUTPUTS	
Materials	**Units of Measurement**	**Products**	**Units of Measurement**
Paper	400,000 kg	Print Materials	260,000 kg
Printing Ink	547 kg	**Waste**	
Auxiliary Material		Waste Paper	140,000 kg
Printing Oil	1.5 l	Packaging	25,000 kg
Colour Thinner	23 kg	Printing Plates	2,250 kg
Printing Powder	15 kg	Cleaning Rags	9,600 rags
Moisturiser	200 l		
Binding glue	1,000 kg		
Working Material		**Special Waste**	
Film and Assembly Sheets	753 kg	Ink	20 kg
Film Developer	200 l	Developer Baths	1,060 kg
Fixer Bath	200 l	Fixing Baths	1,000 kg
Assembly glue	12 l	Chemical Waste	20 kg
Offset Printing Plates	2,670 kg	Used Cleaning Fluid	0.1 m^3
Plate Developer	260 l		
Plate Developer Regenerator	220 l	**Other Waste**	
Plate Developer Gum	260 l	Domestic waste	105 m^3
Plate Correction Fluid	22.5 l	Film and celluloid	600 kg
Cleaning Fluid for Printing Cylinders	440 l	Used Oil	0.02 m^3
Other Cleaning Materials	130 l		
Oils	70 l		
Packaging	2,400 m^2		
Water		**Effluent**	
Sanitary Facilities	931 m^3	Sanitary facilities	931 m^3
Developing Machines	97 m^3	Developer Equipment	97 m^3
Printing	7.5 - 10 m^3	Hand moisture	5 m^3
Hand moisture	5 m^3	Printing Cylinder	5 m^3
Cylinder cleaner	5 m^3		
Air moisturiser	26 m^3		
Electricity			
Machines	106,000 kW-hr		
Other uses	11,000 kW-hr		
Natural Gas	222 kW-hr		
Heating	187,530 kW-hr		
Diesel Fuel	24,650 kW-hr		
Unleaded Petrol	90,990 kW-hr		

The chemical properties of auxiliary materials and accessories determine that they partly assume greater ecological significance than the primary raw materials. In order to limit environmental risks on site Company Beta developed a materials inventory identifying the combustible, toxicological and other hazardous properties of all its materials. The majority of used cleaning rags are hired from a local firm which also cleans and returns them to Company Beta for reuse. All water used at the company has been drawn from the main water supply. Measures to reduce the amount of drinking water used on sanitary grounds are being considered by Company Beta (Table 8.50). The importance of reducing air emissions was noted but no effective means of describing air emissions in quantitative or qualitative terms were identified by the company.

Energy is used in the form of electricity (lighting, machine power), natural gas (kitchen), heating (public power station) and petrol (vehicle fleet). Forty-five percent (45%) of company energy has served to heat the building (Table 8.49). Planned heat insulation measures aim at reducing heat energy costs. Electricity accounts for 28% of company energy use. Since much of the electricity is used to power machines, significant improvements in electricity consumption are not anticipated. The annual petrol consumption of fleet vehicles was recorded at 127,000 km with each vehicle averaging 9 litres of petrol. This level of petrol consumption was described as acceptable; additional improvements would result from using more energy efficient vehicles.

All waste paper at Company Beta is recycled (Tables 8.49 and 8.50). Since the end products are determined by customer requirements there is limited scope for the company to influence its products. Every opportunity has been taken to encourage its customers to accommodate environmentally friendly measures such as the use of recycled paper. Cardboard made of 100% recycled paper is used as packaging or polyethylene film to prevent moisture damage. At Company Beta waste in all departments is separated into different streams on the basis of paper

type, working materials and domestic waste. Offset printing plates and film developers[141] and fixing agents[142] formed the majority of special waste. At the time of interview Company Beta was considering ways to further reduce such waste to enhance its environmental credentials and achieve competitive advantage (Tables 8.49 and 8.50). Other forms of waste categorised as domestic refuse is disposed of via public waste services.

Wastewater generated by Company Beta was described as being similar to that produced in average households and is disposed of in like manner. Effluents produced when cleaning photographic development equipment were revealed to also fall within permitted legal effluent limits. Cleaning the dampening rollers of an offset lithographic press has been achieved through water jetting equipment without detergents. The absence of detergents when cleaning printing rollers has kept effluent and negative environmental impact levels down to a minimum.

Air emissions were described as arising during material binding and in the vehicle fleet area. At the time of interview no data had been produced by Company Beta on the concentrations of harmful substances released as a consequence of company environmental aspects.

8.2.3.1.2.3 Environmental Management (Company Beta)

An Environmental Working Party operates within Company Beta comprising the Company Director who also performs the role of the Environmental Protection Officer, the Film Setter (Waste Officer), the Printing Manager (Safety Officer), an Offset Printer (Hazardous Waste Officer) and the Company Owner (Water/Energy Officer) (Figure 8.2). The Company Director has direct authority to issue directives

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[141] Film developers are chemical solutions containing reducing agents and other compounds that convert the latent image of an exposed photographic material into a visible image. Film developers may be formulated for a specific purpose or may be of more general use.

[142] After a photographic emulsion has been developed and rinsed in water or a stop bath, it has to be fixed in order to remove all residual, unreduced silver halides and become stable to white light. Examples of widely used fixing agents are sodium thiosulphate ($Na_2S_2O_3$) and ammonium thiosulphate ($NH_4S_2O_3$).

whilst the other members exercise a consultative function. The four broad aims of the Environmental Working Party are to:

(i) Ensure environmental security;

(ii) Uphold all relevant environmental legislation;

(iii) Guarantee the continual improvement of corporate environmental protection;

(iv) Safeguard the health of company employees.

All corporate environmental tasks have been performed by the Environmental Working Party, whose members assumed responsibility for quality and safety concerns of Company Beta. These tasks have included the following activities:

(i) Preparation of company environmental goals;

(ii) Development and implementation of an environmental programme aimed at protecting the physical environment and health of the workers;

(iii) Production of working procedures in relation to defined environmental measures and information for the workforce;

(iv) Discussion of company quarterly and yearly reports;

(v) Revision of company accident protocols and define strategy for risk avoidance;

(vi) Examining all suggestions concerning company environmental improvement and resolving current environmental problems;

(vii) Planning for environmental protection investments;

(viii) Provision of environmental information for the public.

Company Beta described itself as acutely aware of its responsibility to sparingly use finite natural resources. The company demonstrates its commitment to environmentally sustainable practices through conformance to the following principles which it believes define environmental accountability:

(i) Continuous optimisation of raw material inputs as a result of reducing and recycling waste materials - Company Beta described their pursuit of process modifications and the production of a qualitatively higher value product with, for

example, a longer life cycle, as important contributory factors in the reduction of their waste volumes.

(ii) Exclusive use of environmentally friendly materials and products - Concerted efforts have been made by Company Beta to assess the environmental impacts of corporate purchases. Where the use of environmentally damaging materials could not be avoided improvements were made to technical production processes to minimise their impact. The company describes itself as being prepared to bear the financial responsibility of reducing negative environmental impacts wherever economically viable. The aim of Company Beta is to demonstrate that a high quality product and environment enhancing production methods are not mutually exclusive pursuits or achievements.

(iii) Dissemination and development of the company environmental philosophy through dialogue with the public, customers, suppliers and employees - In order not to endanger company existence the main priority of Company Beta continues to be satisfying its customers. Potential conceptual conflicts arising from customer requests and company environmental values have been assuaged through the advice given to customers of the benefits gained from employing environmentally friendly products. Employees have been empowered through training courses and additional schooling in the use of environmentally friendly products and production techniques. The Company Director at Company Beta felt this provision in particular guarantees meaningful and enthusiastic contributions from an informed workforce.

(iv) Maximum reduction in company emissions - This goal was described as "obvious, but important to mention", resulting in an improved physical environment and improved physical health of its employees.

(v) Control of corporate environmental behaviour and regular evaluation of company environmental effects - Through these measures Company Beta aims at maintaining its strategy of continuous environmental protection improvement.

In the months preceding EMAS implementation a new environmental policy was developed and environmental guidelines introduced with the environmental

management system. The successful implementation of the system's environmental programmes was described as only possible in view of high motivation levels and commitment to environmental engagement on the part of all employees. Therefore, the Environmental Working Group at Company Beta believed it to be one of its main tasks is to inform all employees about the content and objectives of the corporate environmental policy in order to stimulate active participation and execution of environmental programmes. The success of the environmental system was described as being dependent upon its relevance amongst all employees and continuous attention to system details, including the maintenance of up-to-date system documentation.

The environmental programmes at Company Beta (Table 8.51) target the following:

(i) Reducing the risks of environmental danger through material substitution and legislative conformance with the storage and handling of hazardous materials;

(ii) Reducing and evaluating emissions released by the binding machine and noise associated with corporate activities;

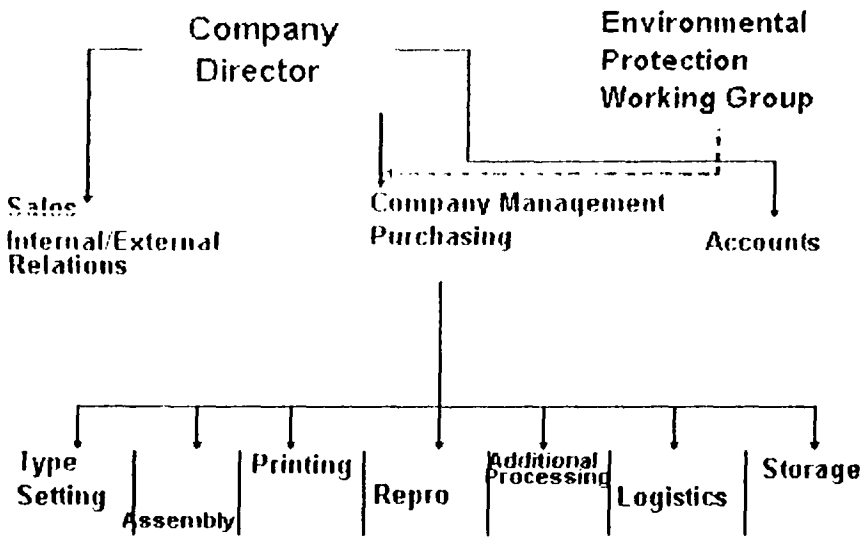
(iii) Reducing waste through a consideration of all possible waste avoidance strategies with the aid of a waste register;

(iv) Reducing water on the basis of feasibility study outcomes on the impacts of recycling of used water and energy reduction by substituting older machinery with new installations with lower energy consumption rates.

Table 8.51: Environmental Programme (Company Beta)

EMS Implementation Schedule	Environmental Measure	Responsible
	Employee Protection and Investment	
ongoing	Substitution of hazardous materials and improving the company Hazardous Materials Register (*Aim: Minimising the risk of environmental danger*)	Environmental Working Party
3 months after implementation	Measurement and evaluation of emissions released by glue-binding machine (*Aim: Reducing emissions*)	Environmental Working Party
36 months after implementation	Identifying and developing waste avoidance potentials (*Aim: Reducing waste output by 5%*)	Environmental Working Party
12 months after implementation	Replacement of existing lighting with energy saving lighting (*Aim: Reducing costs and energy associated with lighting*)	Environmental Working Party
12 months after implementation	Installation of water-saving devices. (*Aim: Reducing water use on sanitary grounds by at least 10%*)	Environmental Working Party

Figure 8.2: Organisation Chart (Company Beta)



8.2.3.1.3 Company Gamma

Company Gamma is a medium-sized enterprise with 110 employees and was originally founded as a leather factory. Its product range included straps, bags, motor belts and sealants. Changes in motor technology, working materials and a general downturn in the leather industry prompted the introduction of a new company production department in the early 1950s. The successful development of various rubber motor belts has been extended to include various elastomer products. Modern production methods along with specially developed and patented machines have made it possible for this company to also competitively produce specialist products in small batches. The decision to develop all of its elastomer mixtures in-house is an example of a measure undertaken by Company Gamma aimed at securing their competitive advantage.

8.2.3.1.3.1 Product Process (Company Gamma)

Rubber processing at Company Gamma has involved the use of rubber mills and mixing machines. The rubber mills shear the elastomer in preparation for mixing. During the mixing stage reactive materials, fillers, oils and protective chemicals of various kinds are incorporated into the base elastomer and mixed in mixing machines. The third general phase is reached after material shearing and mixing when the compound is shaped into the desired form, for example, 'O'-rings and moulded items. In Company Gamma extruders have been used to produce long products such as tubing, tyre treads and wire coverings whilst elastomer mixes are forced through mould chambers where they are cured under steam pressure.

8.2.3.1.3.2 Environmental Impacts (Company Gamma)

Raw materials have been processed alongside vulcanised rubber, fillers and additives through rubber mills and mixing machines in the company's mixing department. Since some of the raw materials are granular, dust particles are released during weighing and mixing despite care taken to avoid material loss. Company Gamma described these materials as constituting no pollution threats.

First of all they are removed from the working environment via suction, secondly, an air filter separates these materials from other air emissions and then they are finally disposed of in accordance with legislative requirements.

Rubber acquires its elasticity by being treated with sulphur compounds under heat and pressure at which point it is transformed from a thermoplastic to an elastic condition[143]. During this vulcanisation process (between 160° - 190° C) small amounts of steam, predominantly hydrocarbon molecules, are released into the air. These emissions are pumped into the wider atmosphere through suction apparatus. On the basis of the level of raw materials processed and the duration of this processing Company Gamma described their activities as producing very little environmental pollution.

As indicated by Table 8.52 freshwater has been supplied through the main water supply and an on-site well. Water extracted from the well is defined by legislative limits. Well water is primarily used for cooling purposes. The main water supply is used for sanitary purposes and in the pressure plant. Water loss through vaporisation is replaced by water from the main supply. During the winter months the steam released by the boiler plant has provided additional heat in the production and office areas.

[143] Elastomeric products acquire their characteristics after being subjected to various modifications. These include strengthening the material by cross-linking the polymer chains, eg, by sulphur atoms in a vulcanisation process, further strengthening by fillers such as carbon black; and treatment with chemicals that provide resistance to weathering and chemical attack. For fabrication into adhesives elastomers are often dissolved into organic solvents and treated with other additives to improve their application, adhesion and durability.

Table 8.52: Water Consumption Statistics (Company Gamma)

	Years Prior to EMS implementation			
Water Consumption	**4 Years**	**3 Years**	**2 Years**	**1 Year**
Municipal Water (m^3)	1601	1515	1364	1431
Well Water (m^3)	6784	6784	3372	770
Total (m^3)	**8385**	**8289**	**4736**	**2201**

Effluent from the mixing mill cylinders which produce the elastomer or synthetic mixtures has been primarily collected in depositories and then disposed of in accordance with legislative requirements. The two fossil fuels employed by Company Gamma are electricity and heating oil (Table 8.53). Electricity has been primarily used in processes to power the rubber mills, mixing machines, in addition to the steel moulds during material curing. Larger presses have been heated by the steam during production and a portion of the warm water produced used by the workforce or heating the production and office areas during the winter months.

Table 8.53: Energy Consumption Statistics (Company Gamma)

	Years Prior to EMS implementation			
Energy Consumption	**4 Years**	**3 Years**	**2 Years**	**1 Year**
Electricity (Mil. kW-hr)	0.971	1.078	1.074	1.180
Heating Oil (Mil. kW-hr)	1.970	2.096	2.240	2.070
Total (Mil. kW-hr)	**2.941**	**3.174**	**3.314**	**3.25**

Two oil-powered steam boilers have served to heat the production processes and buildings. The boilers are checked on an annual basis by a chimneysweeper and every three months by a service technician. These measures aim at guaranteeing Company Gamma operates within legal emission limit levels. During material lamination small levels of toluene have been released, however, Company Gamma claimed permitted legal toluene emission limits are not exceeded. Other company discharges within and without operating buildings were described as within the maximum discharge level parameters defined by clean air legislation. Air containing dust derived from production processes is released into the wider

atmosphere through dust extractors and filters. Collected dust particles have been disposed of in accordance with legislation. Internal noise emissions has been limited to two areas in the company building, in which employees wear obligatory ear protectors and spend very short periods of time. External noise caused by Company Gamma has been the result of the air extractor apparatus in the mixing department and during 'O'-ring production. These areas have been fitted with sound absorbers to prevent external noise constituting a legal hazard.

A portion of waste materials can be reintroduced to the production process. Other forms of waste are separated into appropriate waste streams. At Company Gamma waste utilisation has been preferred to landfilling waste. During the four years preceding the implementation of the certified environmental management system the company waste balance was as listed in Table 8.54. The basic raw and auxiliary materials currently required for Company Gamma products are natural and synthetic rubbers, soot, silica, silicate, chalk, oils, wax, resin, various chemicals and textile fabric. Heating oil, toluene, gearbox oil and hydraulic oil have been the main combustible materials (Table 8.54). In keeping with legislation raw and auxiliary materials have been held in the mixing storeroom whilst the combustible materials secured in a separate storeroom.

Table 8.54: 12-month Material Input-Output Analysis (Company Gamma)

Years Prior to EMS implementation					
Waste Type	**4 Years (tonnes)**	**3 Years (tonnes)**	**2 Years (tonnes)**	**1 Year (tonnes)**	**Utilisation (U)/ Disposal (D)**
Business Waste	9.80	11.94	8.93	8.80	Incineration (D)
Rubber Waste	48.45	43.33	38.80	32.40	Incineration (U)
Cardboard/ Paper	29.59	40.46	21.60	18.44	Refinery (U)
Metal Scrap	23.68	29.12	20.50	16.70	Refinery (U)
Electric Scrap	-	-	-	0.53	Refinery (U)
Wood	10.83	21.66	23.00	25.00	Incineration (U)
Domestic Waste	36.40	36.40	36.40	36.40	Incineration (D)
Synthetic Waste	3.65	3.65	3.65	2.09	Refinery (U)
Total	**162.40**	**186.56**	**152.88**	**140.36**	
Utilised Waste	116.20	138.22	107.55	95.16	
Special Waste					
Contam. Land	-	-	-	1.08	Disposal (D)
Solvents	0.72	1.08	-	0.72	Refinery (U)
Rubber sludge	-	-	3.22	-	Landfill (D)
Basin sludge	-	-	4.50	1.16	Incineration (D)
Contam. Rubber	1.10	-	-	0.60	Incineration (D)
Chemical Remnants	-	-	0.42	-	Incineration (D)
Hydraulic Oil	-	-	0.36	-	Refinery (U)
Drilling Oil	-	0.20	0.20	0.40	Refinery (U)
Spent Oil	-	0.63	0.72	-	Refinery (U)
Waste Fat	0.42	0.48	0.26	0.38	Incineration (D)
Brass Emballage	-	-	0.23	-	Incineration (D)
Total	**2.24**	**2.39**	**9.91**	**4.34**	
Utilised Waste	0.72	1.91	1.28	1.12	
Raw and Auxiliary Material Usage	210.1	210.8	207.7	188.6	

8.2.3.1.3.3 Environmental Management (Company Gamma)

The executive management at Company Gamma has been responsible for developing the company environmental policy and a member of the executive board has exercised direct responsibility for promoting sustainable development measures throughout the company. In order to achieve its defined environmental goals Company Gamma intends to:

(i) Treat environmental protection with equal importance as economic and social concerns of the firm;

(ii) Continually improve corporate environmental protection measures;

(iii) Consciously protect nature's resources on all levels possible. Consequently environmental protection will begin at the product development stage and end at recycling recovered materials;

(iv) Carefully consider the environmental impacts of each product, new activity and new process before their application, thereby avoiding environmental damage and safety risks;

(v) Reuse recovered materials to as far as this is economically viable;

(vi) Encourage a sense of environmental responsibility amongst all employees;

(vii) Nurture open and objective dialogue with its customers, the authorities and the public, contributing to improved mutual understanding;

(viii) Exploit necessary measures which prevent accidents caused the fugitive emissions or energy use;

(ix) Apply the principles and objectives of the company management system to guarantee that all corporate aspects which have environmental impacts are planned, controlled and monitored in order to fulfil all requirements;

(x) Redefine environmental goals and the environmental programme at regular intervals. This redefinition will include regularly conducted environmental audits to assess the efficacy of the company environmental policy, corporate environmental measures and avoid corporate environmental liability;

(xi) Reduce waste, disposables, polluting emissions and effluents through the use of appropriate technology and organisational measures;

(xii) Include company suppliers and contractors in the attempts to improve environmental protection by obliging all individuals engaged in work on company premises to uphold company environmental standards;

(xiii) Examine the company environmental policy in the framework of an environmental audit and management review then committing the policy to change.

At Company Gamma a Management System has been developed to accommodate the company's Quality Management System, based on the ISO 9001 standard, and its Environmental Management System, defined by ISO 14001. The Management System Manager in Figure 8.3, who has been assigned responsibility of the Management System, works in close liaison with the company executive, in particular the Technical Director. All company practices relating to corporate legal compliance are defined through the Management System. Company Gamma described this system as the basis for continuous improvement in product quality, environmental protection and the evolution of its corporate environmental policy. Key tasks performed by the company executive at Company Gamma have included:

(i) Defining and introducing the company quality and environmental policy;

(ii) Providing the resources required to maintain the management system;

(iii) Defining the quality issues to be pursued by the company;

(iv) Providing the Management System Officer with executive support;

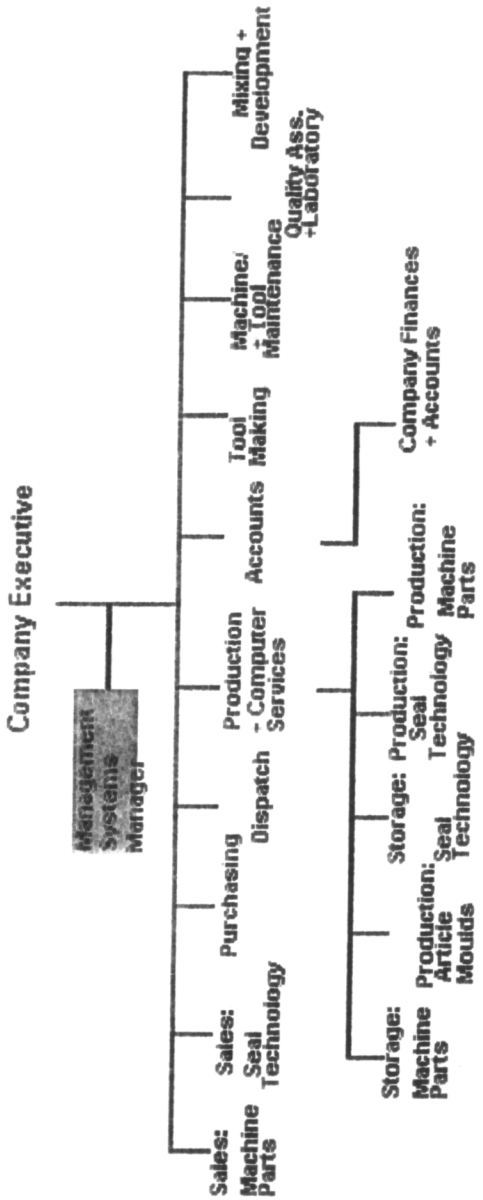
(v) Evaluating the Management System through conclusions drawn from management reviews and system audits;

(vi) Providing an environmental statement;

(vii) Complying with legal requirements;

(viii) Defining and introducing environmental goals and programmes.

Figure 8.3: Organisation Chart (Company Gamma)



Whilst the Technical Director has been ultimately responsible for the Management System and the contents of the Management System Manual, the Management System Manager has been responsible for maintaining the system in accordance with ISO 9001 and 14001 standards.

Within the context of the initial ISO 14001 environmental management review prior to EMS certification Company Gamma introduced a range of measures designed to improve their environmental practice. The heating oil tank was replaced with a double-walled heating oil tank with a leak indicator. Water in the water cooler of the mixing department was reused in order to save water. This measure resulted in approximately 6000 m^3 water saved in a year. Lighting in the central storage area was improved, necessitating the removal of a third of the existing light tubes. This measure resulted in an electricity saving of approximately 18,000 kW-hr in a year. Environmental measures to be implemented post EMS implementation are listed in Table 8.55.

Table 8.55: Environmental Programme (Company Gamma)

EMS Implementation Schedule	Environmental Measure	Responsible
1st Programme	**Resource Conservation**	
6 months after implementation	Modernisation of the boiler plant	Company Exec.
18 months after implementation	Optimising the isolation capability of steam installations	Company Exec./ Mach. Maintenance
	(*Aim of above: Reducing energy consumption by a minimum of 10%*)	
6 months after implementation	Establishing electricity use in each department	Company Exec./ Electr. Maintenance
6 months after implementation	Replacing the ventilators in the temperature rooms	Company Exec./ Electr. Maintenance
6 months after implementation	Installing pre-programmed and automatic lighting	Company Exec./ Electr. Maintenance
	(*Aim of above: Reducing electricity consumption by a minimum of 5%*)	
2nd Programme	**Emissions**	
18 months after implementation	Installing a closed cooling system (with water-cooled condensers and compressors) to recover toluene (*Aim: Reducing solvent emissions by a minimum of 50%*)	Company Exec.
3rd Programme	**Effluent**	
12 months after implementation	Installing an energy-saving cistern *Aim: Reducing water consumption by a minimum of 5%*	Company Exec.
4th Programme	**Waste**	
Ongoing	Influencing suppliers to use reusable packaging (*Aim: Reducing waste by a minimum of 5%*)	Company Exec./ Purchasing
5th Programme	**Employee Protection**	
6 months after implementation	Conducting first-aid courses and exercising fire-fighting drills (*Aim: Improving corporate security*)	Company Exec.

8.2.3.1.4 Review of Company Studies

In each of the company studies the success of the environmental management systems was attributed to the efforts of company executives, management and non-management personnel, which were combined to meet the objectives of set environmental programmes. Environmental improvements derived from these programmes were predominantly products of an economic rationale, resulting in reduced risk of legislative liability and financial savings through more efficient or innovative use of material resources. Chapter Four in its review of environmental information declarations, waste management measures, IPPC regulations and environmental liability highlights some of the economic and legislative issues which would frame environmental management practice in these firms. Companies Alpha, Beta and Gamma also demonstrated commitment to environmentally-suitable purchasing strategies through their use of recycled paper and hazardous material substitutions; organic recyclates were also disposed of in an ecologically conscious way. However, none of these companies committed themselves to exclusively ecological projects which did not generate financial benefits. Environmental orientations within corporate culture were reflected through company environmental policies, which the environmental programmes of the EMS defined and targeted. These reviewed companies had also developed cultures where 'open communication' between all members of staff and procedural transparency were standard practice. Company policies also emphasised the importance of ongoing staff training and learning in order to effectively integrate quality and environmental objectives (Tables 8.40 to 8.45). For each firm EMS ownership represented an opportunity to improve their marketability through an enhanced internal and external company image. EMS practice also enabled these firms to reassess corporate priorities with a view to exploit competitive advantages linked to higher environmental and quality performance.

The experiences of Companies Alpha, Beta and Gamma compliment questionnaire findings on attitudes towards environmental management recorded in Table 8.56.

For each examined issue a larger percentage of UK and German EMS users identified advantages with introducing environmental management than those without an EMS. Whilst UK and German EMS users were attracted by company image improvements and reductions in liability risk borne out of environmental management, significantly more UK firms anticipated cost savings than German firms (Table 8.56: Cost Savings - χ^2, r = 6.63, df = 1, p = 0.01). More German than UK EMS users associated competitive advantages (Table 8.56: Improved Competitive Prowess - χ^2, r = 5.14, df = 1, p = 0.02) and environmentally-friendly product development (Table 8.56: More Environmentally-friendly Products - χ^2, r = 3.38, df = 1, p = 0.06) to follow from environmental management.

Table 8.56: Advantages of EMS Implementation

Advantages anticipated from introducing Environmental Management	**UK %**	**Germany%**
Firms without EMS		
An improved Company Image	57.1	45.0
Risk reduction in terms of Environmental Liability Legislation	63.5	48.6
Improved Competitive Prowess	15.9	15.3
Resource Saving	44.4	35.1
More Environmentally-friendly Products	12.7	26.1
Increased Staff Motivation	14.3	15.3
Greater consideration of changing Customer Demands	25.4	30.6
Maintenance of Company Market Position	19.0	19.8
Cost Savings	33.3	21.6
Firms with EMS	**UK %**	**Germany%**
An improved Company Image	73.9	78.1
Risk reduction in terms of Environmental Liability Legislation	78.3	71.9
Improved Competitive Prowess	17.4	46.9
Resource Saving	52.2	46.9
More Environmentally-friendly Products	17.4	40.6
Increased Staff Motivation	30.4	43.8
Greater consideration of changing Customer Demands	30.4	31.3
Maintenance of Company Market Position	34.8	43.8
Cost Savings	69.6	34.4

8.2.4 Institutionalisation Factors

In Chapter Six the conceptual basis of UK and German industrial policy rationales were explored in order to identify industrial principles and values which underpin cultural discourse in relation to environmental protection. It was argued that policy pronouncements and practices in the fields of employment relations, business financing, vocational training and education can influence both the grammar of environmental protection discourse as well as the interpretation and exercise of corporate environmentalism. Higher collective environmental commitment and action are interpreted by some commentators as the consequences of a general predisposition to environmental probity (Billig 1995, Eder 1995, UBA 1995, UBA 1997a). Such commitment accords with a growing societal understanding of environmental problems as the product of 'ecological interdependencies' (Glasbergen and Cörvers 1995). Environmental orientations are also described as being rooted in cultural orientations of groups and nation states (Douglas and Wildavsky 1982). The balance of public concern about the impacts of chemicals and manufactured food products on human health alongside the impacts of waste materials on the quality of environmental media (UBA 1984, WCED 1987, DoE 1990, UBA 1993a, UBA 1997a, DETR 1998b, ENDS 2000b, UBA 2000b) was mirrored in the research results. Tables 8.36 to 8.39 identified the Chemicals, Rubber and Plastic sectors and Food and Beverages sectors with the widest range of environmental measures, described as currently of importance to their firms. The International Council of Chemical Associations (ICCA), as an organisation representing the interests of particular industry groups, has influenced corporate environmental behaviour by encouraging firms to embrace Responsible Care initiatives. In the UK the Chemicals Industries Association (CIA) introduced a 'Responsible Care Guidance' standard which incorporates the main principles of ISO 14001, EMAS and the Health and Safety specification OHSAS 18000, alongside Responsible Care relating to product stewardship[144], distribution,

[144] The European Chemical Industry Council (CEFIC) has encouraged European firms to commit themselves to the principles of Product Stewardship which extends the Responsible Care programme to products. As such Product Stewardship requires that firms manage health, safety and environmental aspects of a product throughout its total life cycle in a responsible

chemical emergencies and community liaison. Responsible Care is an obligation of CIA membership, which represents 67% of the total UK chemical sales. Each of the members has signed Responsible Care Guiding Principles[145]. Self-assessment to the CIA's Responsible Care Management System became mandatory for all member companies in 2001. A Responsible Care partnership was forged with members of the British Chemical Distributors and Traders Association whilst other associations such as the British Lubricants Federation and British Coatings Federation have developed similar Care Programmes. Associations such as the CIA also fund environmental programmes including the Energy Efficiency Agreement targeting on-site energy audits at SMEs (CIA 1999). In Germany an agreement was signed in 1999 between the *Verband der Chemischen Industrie* (*VCI*), *IG Bergbau, Chemie, Energie* (*IG BCE*) and the *Bundesarbeitgeber Verband Chemie* (*BAVC*). The agreement entailed that workers and their representatives became more directly involved in *verantwortliches Handeln* (Responsible Care) through the provision of intensive training and regular status reports on its implementation. Consequently modular training programs were developed to address all aspects of Responsible Care not previously defined within the German legislative framework[146]. Responsible Care is also a condition for *VCI* membership and almost 99% of all firms in the German chemical industry are *VCI* members. Company commitment to the objectives of the Responsible Care programme was suggested by the high levels of certified and verified EMS ownership amongst UK and German SMEs in the Chemical, Rubber and Plastic sector (Table 8.25: EMAS ownership: UK - 0.0%, Germany 13.6%; ISO 14001 ownership: UK - 18.8%, Germany 9.1%). However, different philosophical

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and ethical manner (CEFIC 2000). Product Stewardship implementation compliments EMS objectives such as encouraging materials management defined under Good Management Practices, Environmental Auditing concerned with product life cycle analysis, the Environmental Management Review of such products and an Environmental Statement outlining product performance and measures for minimising the health, safety and environmental impacts of such products and materials.

[145] All the major UK chemical manufacturing sites are signatories of the Guiding Principles but only around 50% of employees in the entire sector.

[146] The *VCI* has produced annual reports on Responsible Care since 1996. Existing quantitative indicators of performance include those for air emissions, waste generation, water and energy consumption, environmental protection costs, product stewardship, occupational illnesses, occupational accidents, process safety, distribution safety, implementation of EMS reports and statements.

orientations characterising UK and German environmental management discussed in Chapters Four and Six, are nevertheless demonstrated by the CIA's resistance to the introduction of voluntary 'precautionary' approaches (ENDS 1998f)[147].

The foremost interest of national bodies such as the Food Standards Agency (FDA) and the *Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft* (*BVE*) is the protection of public health in relation to food and the control of pathogens in animals. However, these bodies equally recognise the potential benefits to be accrued from quality and ecologically oriented management systems[148]. Research sponsored by the *Bundesumweltministerium* and *Umweltbundesamt* concluded that SMEs in the Food and Beverages sector have significantly increased their environmental management engagement since 1995 in response to a growing number of customers concerned about both the quality of products and the environmental impacts associated with food and beverage production (IMUG 1999). Surveys conducted on behalf of DEFRA also indicated that the UK Food and Beverages industries began to spend more on environmental controls than any other sector. Increased expenditure is described as relating to spending on integrated, cleaner technology, effluent treatment charges and

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[147] The *Umweltbundesamt* has argued that current chemicals policy does not compliment the principles of sustainable development and fails to sufficiently accommodate the *Vorsorgeprinzip*. According to the *UBA* the process for testing risks posed by synthetic materials should be speeded up and more effectively controlled. '*Verantwortliches Handeln*' or 'Responsible action' begins at the point of material planning and product development: "*Mögliche Risiken für Mensch und Gesundheit sind weitgehend zu vermeiden oder wenigstens zu vermindern. Das betrifft alle Phasen des Produktlebens: von Forschung und Entwicklung über Herstellung, Lagerung, Transport, Handel und Gebrauch bis zur Verwertung oder Entsorgung. Verantwortliches Handeln heißt auch, von der weiteren Entwicklung und Herstellung eines Produkts abzusehen, wenn aus erkannten gefährlichen Eigenschaften des Produktes und der bekannten Exposition unvertretbare Risiken für Mensch und Umwelt entstehen.*" (UBA 2000b).

[148] "*... Hohe Sicherheitsstandards in der landwirtschaftlichen Urproduktion und der Futtermittelherstellung sind die unerlässliche Voraussetzung für sichere Rohstoffe zur Weiterverarbeitung. Die Ernährungsindustrie fordert daher, moderne Qualitätsmanagementsystem unverzüglich auch in den vorgelagerten, aber auch in den nachfolgenden Wirtschaftsbereichen flächendeckend einzusetzen ...*" (BVE 2001) p. 2.
Especially since the European BSE crisis during the 1990s the *BVE* has emphasised the need to introduce uniformly high regulatory standards, including principles such as the *Vorsorgeprinzip* discussed in Chapter Four to guarantee food and ecological safety throughout the EU:
"*... Gerade die BSE-Krise - wie auch vorangegangene Ereignisse - zeigen, dass Lebensmittelsicherheit im Binnenmarkt* ***nur*** (bold in original) *durch überzeugende gemeinschaftliche Regelungen gewährleistet werden kann. Gesundheitlicher Verbraucherschutz ist unteilbar. Die Industrie hat Anspruch auf einheitliche gesetzliche Rahmenbedingungen... Von höchster Priorität ist auch die Verabschiedung der geplanten Basisregeglung für Lebensmittel, mit der die allgemeinen Grundsätze und Erfordernisse des Lebensmittelrechts (Gesundheitsschutz, Vorsorgeprinzip, Schutz der Verbraucherinteressen, Rückverfolgbarkeit) sowie die Anforderungen an die Lebensmittelsicherheit und die Verantwortlichkeiten hierfür europaweit harmonisiert und festgelegt werden...* (BVE 2001), p. 12.

tightening discharge consents (ENDS 2001l). The number of Food Associations committed to the production of organic food is indicated by the increasing demand of consumers for firms to objectively demonstrate the organic credentials of their products[149]. This demand, which has been particularly pronounced in Germany (UBA 1995, Poferl, Schilling and Brand 1997, Reeves and Kelly-Holmes 1997), was mirrored in research results. UK SMEs in the Food and Beverages sector recorded the second highest level of UK certified EMS ownership (Table 8.25: ISO 14001 ownership: UK - 5.3%) whilst German SMEs in the Food and Beverages sector possessed the highest collective level of certified and verified EMS ownership (Table 8.25: EMAS ownership: Germany - 14.3%, ISO 14001 ownership: Germany - 11.4%).

More German firms in the Food and Beverages sectors, followed by the Chemicals, Rubber and Plastics sectors, currently committed themselves to ecologically-oriented measures. The UK pattern of sectoral commitment shared broad similarities with German firms in terms of order but was less extensive than their German counterparts. This was illustrated by the commitment to ecological product development by the UK Machinery sector, which recorded the highest percentage commitment amongst the UK sectors (Table 8.36: UK - 32.4%). Whilst the corresponding commitment of the German Machinery sector was higher (Table 8.36: Germany - 38.8%) it recorded the lowest percentage level of German sector commitment to ecological product development in overall terms. The comparatively greater engagement of German SMEs in activities such as

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[149] The European Community Regulations EEC/2092/91 on the Production and Marketing of Organic Food and EEC/880/92 on the Award of a Community Eco-Label provided additional impetus to the organic and environmentally sustainable food markets which previously had long traditions in the UK and Germany. The Soil Association was established in 1946 and has maintained high environmental standards in keeping with the European Union regulations. The United Kingdom Register of Organic Food Standards (UKROFS) was introduced in 1987 to impose standards for organic food and provide official certification comparable to the organic standards of the Soil Association. In 1988 nine key German Food Associations (*ANOG, Biokreis, Bioland, Biopark, Demeter, Eco Vin, Gäa, Naturland* and *Ökolsiegel*) formed an Organic Food Association (*Arbeitsgemeinschaft ökologischer Landbau,* (*AGÖL*)) which are governed by more rigorous regulations defined by EEC/2092/91 and EEC/880/92. In addition to imposing regulatory measures which secure high quality organic foodstuff *AGÖL* also encourages the use of technology and techniques which reduce effluent levels, emissions and transport costs associated with organic production as well as the extensive use of sustainable packaging amongst all firms within its membership.

ecologically oriented product development and environmentally sensitive purchasing can be seen in the light of German environmental research and policies of the *Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie* (*BMBF*). Three key objectives funding schemes of the *BMBF* are:

(i) intensifying research and development in the field of industrial production and new materials;
(ii) identifying integrated sustainable solutions for production systems which enhance cooperation between natural, engineering and social scientists themselves and their cooperation with industry;
(iii) systematic application of research results amongst SMEs and supporting measures which encourage effective inter-company networks.

Clean Technology Research headed by the Biology and Biological Sciences Research Council (BBSRC), the Engineering and Physical Sciences Research Council (EPSRC) and the Economic and Social Research Council (ESRC) have supported UK manufacturing and environmental development through collaborative research projects between business and research base organisations (BBSRC, EPSRC and ESRC 1994). The Groundwork Foundation also operates through a network of regional Trusts and a central Environmental Business Services Unit in order to increase environmental responsibility throughout the business community. It has considerable expertise in support of both SMEs and larger companies and has used its influence to improve the performance of supply chains (Groundwork 1995, Groundwork 1998). However, in practice German SMEs have directly and speedily benefited from research which promotes the design of products from the perspectives of resource efficiency, reusability and recyclability in order to effectively harness resource regeneration processes[150]. The statistically significant

[150] For example, the *Ma Tech Programme* (Materials for Key Technologies of the 21st Century) was introduced in 1994 and has served to catalyse the innovation and practical application of research results in industry and encourage SME engagement in the processes of innovation. Currently 21% of grant recipients are SMEs, 47% are research institutions and 32% large enterprises (BMBF 2000).

levels of German corporate commitment to practices with an ecological orientation (Tables 8.15 and 8.35: Factor 8.1) can be directly linked to the activities of State institutions and other business organisations.

The comparatively lower levels of commitment to environmental measures in the Machinery sector were not indicative of an absence of environmental commitment. Firms in the Machinery sector invariably combine wide ranging chemical processes to develop products and have been at the vanguard of environmental technology manufacture. As previously mentioned, UK firms in the Machinery sector also recorded the highest level of commitment towards ecological product development and German firms in this sector recorded the second highest commitment to improving technical equipment. Even greater focus on waste minimisation, environmentally-suitable product development, ecological product development and environmentally sensitive purchasing beyond current levels can be anticipated by firms in the Machinery sector following the introduction of producer responsibility legislation proposed for Waste Electrical and Electronic Equipment (WEEE)[151].

Since 1996 German transport policy has aimed at resolving problems associated with limited capacities of the transport infrastructure alongside ecological and health aspects[152]. One of a range of transport research outcomes includes a free 'Transport and Environmental Management Guide' published by the *UBA* which has helped firms to practically and concisely register environmental impacts caused by

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[151] WEEE legislation would require producers to contribute towards costs and collecting and recycling equipment. It would also set minimum operating standards for recyclers and ban the use of heavy metals and some brominated flame retardants from 2008. MEPs also want the Directive restricting hazardous substances to address other issues in future, for example the feasibility of replacing other halogenated flame retardants and hydrofluorocarbons (HFCs), at least 5% of the weight of plastic components of WEEE would have to be recycled and collection targets would be raised from 4kg to 6kg of WEEE from private households per capita per year (ENDS 2001e).

[152] This programme was primarily concerned with enhancing efficiency, technological and safety aspects of existing transport systems. The new Mobility and Transport research adopted by the German cabinet in March 2000 extended the objectives of the previous programme by integrating various mobility and transport policy fields, including organisational, structural and social developments. It is envisaged that this more sustainability-oriented approach will better secure Germany's competitive position and, by extension, safeguard existing and future employment in the transport sector. One of the successful research programmes conducted by the BMBF involves improving conurbation transport networks via intermodal measures, including intermodal transport such as switching from road to sea journeys or inland waterways or optimising transport routes through transport telematics.

business transport. This is an important development since EMAS-II requires greater consideration of transport impacts in the management of the environment[153]. The guidelines have helped companies to comprehensively account for noise pollution, harmful exhaust emissions, space utilisation and other environmental impacts for all transport media ranging from cars to ships, including forklift trucks and other machines. The guidelines were primarily developed to offset difficulties experienced by firms attempting to calculate transport-oriented impacts in Environmental Statements and Reports but attracted general interest amongst firms seeking to reduce transport related costs[154] which is reflected in German respondent transport commitments (Tables 8.15 and 8.36).

The comparatively greater commitment to water effluent reduction and dealing with water-damaging substances by German SMEs in this research can also be attributed to institutionally driven interests. In response to *Resourcenvorsorge*, specifically, *Wasservorsorge* principles, continuous efforts have been made to improve German treatment and disposal technologies through State funded research and statutory requirements. Examples of targeted areas of development include cost-optimised technologies for water supply and waste water disposal which result in minimum environmental impacts or maintenance work; another has been more effective waste and contaminated site management technologies such as biomechanical waste treatment (BMBF 2001). Measures to minimise waste was an important concern of all sectors, with marginally more firms in the Chemicals, Rubber and Plastic sectors, followed by the Pulp, Paper and Packaging sectors strongly identifying with this activity. Energy saving measures were pursued by all sectors, with marginally more UK firms identifying with these activities in the

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[153] EU Regulation 761/2001 Articles VI.2(g), VI.3(a) and VI.3(d).

[154] In an Environmental Transport Workshop presented by the *UBA* and the commissioned researchers from the *Institut für Energie- und Umweltforschung* (*ifeu*, Institute for Energy and Environmental Research) in March 2001 representatives from firms and environmental verifiers were able to discuss the implications of more rigorous transport environmental requirements in the revised EMAS II. The benefits of environmentally-oriented transport measures were demonstrated through pragmatic solutions applied to freight and personal transport, fleet transport control, ECO-driver training for goods vehicles and the formulation of a corporate transport plan. Drivers in receipt of ECO-training were able to generate energy savings of between 10% and 15% during use of fleet vehicles. For more information refer to UBA (2000c).

Chemicals, Rubber and Plastic sectors followed closely by the other three grouped sectors (Table 8.39). In the UK considerable efforts have been made to highlight the beneficial corporate impacts of material efficiency. The Aire and Calder project, which was launched in 1992, illustrated how considerable cost savings could be made by substituting waste treatment or end-of-pipe solutions with waste minimisation strategies and cleaner technology. The appreciable resource savings identified through the Aire and Calder Initiative subsequently encouraged other waste minimisation projects and activities within UK firms[155], which is reflected in research result emphases (Table 8.39 - Energy Saving and Energy Efficiency). Water Efficiency Awards in the UK have also recognised and rewarded good practice in water efficiency within industry and business sectors. Water projects have included those which improve water consumption in manufacturing processes to facilities' management programmes in an innovative manner, or internal communication activities which motivate staff to conserve water[156].

Greater commitment to changing production processes on the part of UK firms (Table 8.38) can be understood in the context of the Integrated Pollution Prevention and Control (IPPC) Directive and Pollution Prevention and Control Act 1999 (PPC 1999) which set out to prevent significant pollution from industrial activities. Although large industries have been the most affected by PPC 1999, installations covered are defined in different ways. For example, waste incineration is measured by a capacity of one tonne or more per hour, where 'capacity' refers to a historical throughput and not a theoretical maximum. Other definitions refer to the

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[155] Key objectives of the Aire and Calder Project were to: (i) demonstrate the benefits of systematic emission reduction strategies, (ii) focus on process changes and clean technology, (iii) encourage environmental data collection and reporting to identify business costs and benefits, (iv) identify deficits in environmental knowledge and expertise. Financial savings of over £3.3 million a year have been made by 11 companies participating in the Aire and Calder Initiative whilst savings of £2.3 million a year have been made by each of the 14 companies forming part of the Project Catalyst Initiative conducted by the DTI. Other waste minimisation club schemes are run in the following regions: the Dee (North Wales), the Don, Rother and Dearne catchments (South Yorkshire), the Medway (Kent), the Humber Estuary, Merseyside, Leicester Waste Minimisation Initiative, Morecombe Bay, the Severn Estuary, the Thames Valley, the Tees, the West Midlands.

[156] The programmes and projects will also include robust process methodologies, the benefits of which can be further communicated within and without the practising organisation. Further information on the categories within the Award can be obtained from the Environment Agency, the Water UK Industry Association or the Environment and Energy Helpline.

type of activity, such as 'recovering carbon disulphide'. The definition of an installation need not refer to a whole site or factory but will be determined on the basis of responsibilities and functionalities. Therefore, operators applying for installation permits will need to account for the actual environmental effects of installations, including heat release, noise and vibrations, energy use, consumption of raw materials and the risk of accidents based on BAT criteria and not BATNEEC which defined previous operating installation standards. Changes to existing UK installation permit conditions will require upgrading production processes in general and specific ways throughout manufacturing sectors, including the food and milk industries, in a phased manner up to 2007. Under PPC regulations there is also a duty to use energy more efficiently. This measure along with the requirements of the UK Climate Change Levy[157] have influenced UK corporate commitments to energy saving and efficiency strategies which have more in common with the objectives of the *KrW-/AbfG* and the *Ökologische Steuerreform* (Tables 8.15 and 8.39). On the basis of PPC regulations relevant UK operators will need to carry out geological and hydrogeological surveys plus site assessments to determine whether soil quality and chemical character will prevent pollution throughout the duration of company activities. These regulations extended corporate duty of care to returning a used site to an environmentally satisfactory state once the site is closed. The additional commitment of UK firms to measures which prevent accidents and the contamination of groundwaters or land can also be attributed to legislative changes in the UK which now share more of the conceptual objectives of the *KrW-/AbfG* and the *UmweltHG*, discussed in Chapter Four. These regulations have influenced German environmental engagement for some time, so although environmental control measures remain important for German firms the additional commitment to preventing and restricting environmental damage or disturbance did

[157]The UK Climate Change Levy came into force in April 2001. The Levy was designed to encourage the business community to reduce emissions of greenhouse gases and promote energy efficiency. The estimated £1 billion raised by the Levy is to be redirected to business via a 0.3% reduction in National Insurance contributions, thereby discouraging pollution and promoting employment. Sizeable discounts will be available to energy intensive users who commit themselves to specified energy saving targets defined by the UK Government and relevant trade associations. The discount will apply to all processes subject to the PPC regulations even if their throughput is less than the relevant threshold.

not, therefore, preoccupy German firms with the same level of immediacy (Tables 8.15 and 8.37). UK Pulp, Paper and Packaging sectors Production displayed the strongest commitment to changing production processes whilst firms in the German Pulp, Paper and Packaging sectors were most committed to introducing new production processes (Table 8.38) and the second highest in the prevention of environmentally-damaging accidents (Table 8.37). These current commitments also reflect the fact that the Pulp, Paper and Packaging (board-manufacturing) sector was the first to be subject to IPPC installation requirements defined through introduced *VerpackV* and PPC regulations. In Chapter Four German corporate values in the Pulp, Paper and Packaging sector were described as providing significant impetus for corporate environmental management. The comparatively higher levels of EMAS registered sites amongst the German researched firms in the Paper, Pulp and Packaging sector (Table 8.25) accords with previously recorded levels of national site registration in the European Union (ENDS 1998e). The significantly lower level of German SMEs possessing certified environmental management systems also implies a gravitation towards an EMS which is more suggestive of 'environmental commitment' within the context of the *KrW-/AbfG*, *VerpackV* and the *UmweltHG*.

Whilst legislative developments in general and specific ways can be described as encouraging EMS use company attitudes towards the supply chain as a similar device was ambivalent. Although some companies described themselves as subject to the environmental policies of their customers, firms with ISO 14001 and EMAS also expressed a reluctance to 'overburden' their suppliers with requirements beyond contractual necessities. The following interviewee comments were typical amongst such firms:

"You suggested that in order to create a greater sense of environmental focus amongst SMEs there should be more pressure exerted by suppliers...

No, I don't think that is the case. I think that they need to be aware of the fact that environmental management systems exist but that is not going to drive them into putting an EMS in place - I don't see it as our job to push this one through

Not in the same way as Quality Management

No, absolutely not, because that has a direct impact on us in all sorts of ways; your environmental impacts are very much a local decision for you and where you are and what the local issues are - we are not in a position to make that judgement call. I know that the Government is starting to put pressures on people to produce environmental reports, for example, which may again effect people's perceptions of it - one of the things it is trying to do is raise companies' environmental awareness - I think that is something that has to go on over a period of time and there are all sorts of ways of doing that - but I don't think that the supply chain in a way, certainly in our industry it is not... The Quality crusade definitely came down the supply chain, because it had a direct impact - if we were purchasing from somebody else, then, we are buying a product and we want to know that it is being made in a safe, reproducible way, and certainly bigger companies took it on board, and started to push the pressure down the line... now I don't think in my experience of this industry that there is the same view of the environmental point of view. We put our environmental system in and sent out questionnaires to our key suppliers and asked the question if they are putting ISO 14000 in place but it does not stop them controlling the environment, the fact that they do not have an accredited environmental management system." **Quality Systems Manager, Food and Beverages.**

Understandings of environmental risk are also described as being modulated or configured by attitudes prevalent in the informing media (Kinder and Kiewit 1981, Rohrschneider 1988 and Kasperson et al 2000). These conclusions are supported by quantitative and qualitative research findings which identified particular attitudinal responses with UK and other responses with German cohorts. The collective attitudes of UK and German firms were essentially maintained amongst firms with and without an EMS. A statistically significant number of German firms with an EMS believed technological invention would solve environmental problems (Table 8.57 - Germany - χ^2, r = 7.62, df = 2, p = 0.02) and the effect of modern technology was predominantly positive (Table 8.57 - UK - χ^2, r = 8.56, df = 2, p = 0.01). More UK SMEs linked the continuous exploitation of nature with irretrievable damage to natural resources (Table 8.57 - UK - χ^2, r = 6.64, df = 2, p = 0.03). UK and German interviewees tended to be critical of the general media as a facilitator of positive environmental action; dedicated environmental media attracted measured

commendation, as was expressed during the following two company interviews in the Chemicals sector:

> "... The media tends to focus just on certain issues that may be around at that time. If you ever look in the paper there is always a buzzword, isn't there - I don't think when you're looking at the papers the environment and environmental aspects are well covered." **Environmental Manager, Chemicals**.

> "No - I think if you are talking about environmental press - ENDS, Environmental Business News, etc, - yes, they give a good account of it and I think they are pretty unbiased in what they say - if you are talking about the general press, then the general press are only really interested if there is something sensational they can make out of it, so if they are talking about the Landfill issue then one of the newspapers may say "WE ARE RUNNING OUT OF LANDFILL SPACE" whilst another paper will say "YOU WILL HAVE PILES OF RUBBISH SITTING IN FRONT OF YOUR DOORS IN THREE YEARS" - I think that the informed opinion is very important; the generalisations that we get in the media does not do anyone any good." **Quality Manager, Chemicals**.

Interviewees supported the conclusions reached by Downs (1972) by associating the general media with sensationalist news reporting and the tendency to allow other news issues to detract from consistent attention to serious environmental problems. Other interviewees pointed to an absence of forms of environmental knowledge presented by the media which could promote a greater commitment to environmental protection and related causes:

> *"... Nein. Ich habe an sehr viel Veranstaltungen teilgenommen, die sich mit diesem Thema befassen und es wird von seiten der Medien, ja, es wird mal wahrgenommen aber nicht als weitreichendes Instrument anerkannt. Zum Beispiel die ISO Norm - die wird also in der Öffentlichkeit wesentlich attraktiver wahrgenommen, obwohl sie gar nicht so umfangreich ist, wie das Öko-Audit... Denn wir merken das immer wieder, daß in der Öffentlichkeit über das Öko-Audit überhaupt nichts zu hören ist. Nur in der Fachpresse wird geschrieben aber nicht in der allgemeinen Tageszeitung zum Beispiel oder im Rundfunk und Fernsehen - Öko-Audit ist etwas, was hochwissenschaftlich ist - nicht für den täglichen Bürger. Das wird also meines Erachtens viel zu wenig in den Vordergrund gerückt - wieviel Ersparnisse das gibt und wie wir das in der Zukunft nachhaltig benutzen können und wie das für die Enkelkinder usw von Vorteil ist."* (No. I have taken part in many seminars dealing with this issue and the media for its part, yes, the media is aware [of environmental problems] but cannot be acknowledged as a really influential instrument. For example ISO 14001 - this is presented to the general public as the more attractive option, although it is less far-reaching in its scope than EMAS ... You notice it time and again, absolutely nothing can be heard about EMAS in the public arena. There are reports in specialist publications but nothing in daily papers, for example, or on radio and television - EMAS is [held to be] a specialist scientific concern - not for the ordinary citizen. In my opinion

Table 8.57: Response of UK and German Firms Towards Statements in Relation to the Physical Environment (Companies with an EMS)

Statements in relation to the	UK			Germany		
Physical Environment (EMS)	Yes	N/N*	No	Yes	N/N*	No
Worries about secure employment are more pressing than thoughts concerning the future of the environment	52.2	23.9	23.9	38.3	40.0	21.7
Preoccupation with environmental protection increases cost pressures within firms which unavoidably result in job losses	13.0	8.7	78.3	13.3	25.0	61.7
Technological invention will solve pollution problems	28.3	32.6	39.1	55.0	21.7	23.3
Ecologically-insensitive management practice within firms will endanger the survival prospects of such firms in the foreseeable future	71.7	15.2	13.0	83.3	10.0	6.7
The increasing cost of environmental protection negatively impacts our standard of living and by extension the health of the national economy	13.0	21.7	65.2	15.0	25.0	60.0
The 'media' exaggerate the scale of environmental problems we face	37.0	13.0	50.0	28.3	38.3	33.4
We live in a society in which the negative side of progress increasingly determines the nature of debates concerning the environment	54.4	30.4	15.2	46.7	35.0	18.3
All employees should be taught about environmental protection as part of their occupational training	95.7	2.2	2.1	90.0	8.3	1.7
Continuous exploitation of nature causes irretrievable damage to the natural resources, upon which all societies are dependent	71.7	10.9	17.4	65.0	28.3	6.7
The effects of modern technology are predominantly positive	45.7	41.3	13.0	73.3	21.7	5.0

*** Neither Nor**

> too little is done in order to push EMAS to the fore - the cost savings that can be made from it and how we can use the system in a sustainable way and why that serves the interests of our grandchildren, etc.) **Company Director, Printing**.

German interviewees, particularly those in the Printing and Packaging sectors, intimated that the regulatory demands of the *UmweltHG* and the *VerpackV*, which embodies the 'polluter-pays' principle, directly influenced the company decision to implement EMAS. The correspondingly lower levels of certified ISO 14001 management systems in the Printing and Packaging sectors compared with the consistent levels of certified and verified environmental management systems in the other German industry sectors is also supportive of the view of that there is a correlation between packaging waste legislation and the environmental action on the part of SMEs in the Printing and Packaging sectors:

> *"Bei uns ist das Verursacherprinzip in dem Sinne, daß derjenige, der die Dinge zurücknehmen muß, derjenige ist, der sie in Umlauf gesetzt hat und das ist in der Wellpappe eigentlich voll geregelt - es gibt keine Branche in dem Prozentsatz, der so einen Rücklauf hat, wie gerade die Wellpappe."* (In our case the 'polluter pays principle' [influences company behaviour] in the sense that the one who has to take the things back is the one who produced it in the first place and this has been fully regulated in the cardboard industry - there is not another sector which has such a high percentage level of material returns of its products as the cardboard industry.) **Company Director, Packaging**.

There was a general appreciation amongst interviewed firms that environmental principles, which embody institutional values, become manifest through legislative processes and could only be understood within the context of applied law. The interviewee comments below highlight this understanding:

> "Part of the reason for all of our site improvements, as well as going for an environmental standard, is that if there are any spills or damage to the watercourses we're going to get a hefty fine for it. It's coming from the legislation, you see that you have to take more care, you have to protect yourself in that way. The more you do, the less likely you're having to pay out, so in that respect rather than somebody saying "the polluter pays" and actually being mentioned as such, its coming from the fact that you know you will have to and you want to avoid it as much as possible." **Environmental Manager, Chemicals, Rubber and Plastics**

Whilst legislation was identified as a key driver of environmental change for both UK and German responding firms, Table 8.23 indicates that (attitudes towards) legislative influences generating environmental change in the UK and Germany are different. Environmental reporting to the *Statistisches Bundesamt* defined by the requirements of the *UStatG* contributes to:

(i) the provision of extensive and well defined company environmental guidelines (Questionnaire Section 4.1(K), 'In this firm environmental protection guidelines are both clear and understandable' - Yes: UK - 38.5%, Germany - 65.1%; χ^2, r = 19.63, df = 2, p = 0.00005);

(ii) the framework for environmental programmes related to the provision of such information (Questionnaire Section 5.11: 'Does your firm have an environmental programme and have environmental responsibilities been assigned to the workers?' - Yes: UK - 16.5%, Germany - 63.4%; χ^2, r = 64.55, df = 2, p = 0.00000).

The higher levels of German firms with specified guidelines and environmental programmes was counterbalanced by higher levels of environmental committees, teams and working groups amongst the UK responding firms (Questionnaire Section 5.12: 'Has an Environmental Committee, Team or Working Group been formed within your Firm?' - Yes: UK - 32.1%; Germany 19.8%; χ^2, r = 5.48, df = 1, p = 0.01).

Greater environmental regulation density and being subject to higher levels of related administration may account for the lower levels of German firms with written environmental guideline specifications covering all environmental legislation compared against UK responding firms (Questionnaire Section 4.2: 'Are environmental guidelines in writing within your firm?' - Yes: UK - 49.1%, Germany - 37.8%; χ^2, r = 5.33, df = 2, p = 0.06):

> *"... Überhaupt nicht - mit unseren Gesetzen - das geht nicht, gar nicht. Wir bemühen uns darum - wir haben Handbücher entsprechend und wir bemühen uns von seiten des Verbandes und von seiten der einzelnen Organisationen, durch die Änderungen veröffentlicht werden ... Man müßte*

> *ja auch praktisch ein Wissenschaftler sein, wenn man diese ganze Umweltgesetzgebung umfangreich kennen würde. Die wichtigsten Dinge, die wir wissen müssen, die kennen wir aber alles andere - ich weiß nicht. Wir haben hier Ordner mit 2000 Seiten stehen - wenn wir alle kennen sollen, dann (Gelächter). Wir haben sogar solche Umwelthandbücher gedruckt für das Bundesland und man sieht auch wie schnell der Wechsel dieser Gesetze ist und wie schnell in den Handbüchern die Auswirkungen sich ändern und die Beurteilung, wie man was handhaben soll, sich ändern."* (Absolutely not - with our laws that isn't possible, not at all. We do our best - we have relevant manuals and we access all relevant information from trade associations and individual organisations which publish legislative changes ... Basically, you would have to be a scientist or an academic to be fully familiar with environmental legislation. We know about the most important things which we need to know, but anything over and above that - I don't know. We've got files with 2000 pages full of legislation - if we are supposed to know all of that, then (laughter). We have even printed such environmental reference manuals for our *Bundesland* and one can also see how quickly legislation changes and observe the impact of such change in reference manuals and how quickly defined approaches relating to such impacts are themselves subject to modification.) **Company Owner, Printing**.

The strongly held view on the part of German responding firms that environmental legislation had reached the end of its effectiveness is to be understood in the context of the comparatively greater demands placed on firms by their national legislative framework. The following three comments of different company managers represent the views voiced by essentially all interviewed German companies:

> *"Als Antwort auf Ihre Frage 'Sind wir mit allen relevanten Umweltschutz-verordnungen in unserem Tätigkeitsbereich vertraut?' muß ich ehrlich sagen 'Nein'. Der Zuwachs an Regelungsnormen der letzten Zeit ist radikal gestiegen. In der Bundesrepublik ist die Novellierungen von Gesetzen und Rechtsverordnungen, wie Sie wahrscheinlich wissen, eine Vollzeitbeschäftigung, eine 'Industrie'... "* (In answer to your question 'are we familiar with all the relevant environmental regulations in our area of work?' - I would have to honestly say 'No'. The recent growth in regulatory standards has been extreme. In Germany legal amendment of laws and edicts is, as you probably know, a full-time job, an industry...) **Technical Manager, Machinery**.

> *"Wir haben eine [Umwelt] Meldepflicht zur amtlichten Statistik, die weit über die administrativen Leistungen und den Infomationsbedarf von anderen europäischen Ländern hinausgeht."* (Our [environmental data] declarations to the Federal Office of Statistics are way above the administrative levels and information requirements of other European countries.) **Company Manager, Packaging**.

> *"Was sicherlich keine Ersparnis ist, in erster Linie, in Zeiten wenn Veränderungen hier durchgeführt werden, wenn Investition oder Umbau durchgeführt werden, ist schon das behördliche Genehmigungsverfahren ein echt fürchterliches. Also, wenn man nur in einer Maschine einen*

> *bestimmten Teil versetzen will, alles andere ändern muß, das ein Genehmigungsverfahren fordert, was 1 bis 3 gefüllte DIN A4 Ordner mit sich bringt und ein halbes bis zu einem ¾ Jahr an Genehmigungsfrist braucht, ist kaum nachzuvollziehen ... Es kommt hinzu teilweise von der Erfahrung, die wir gemacht haben, wenn man vorher über die Dinge mit den Behörden spricht, scheint es besser zu gehen, dann bekommt aber man durch die Genehmigung, wenn man mal genau durchblättert, dann sind da auch wieder zwischen 20 und 50 unterschiedliche Auflagen dabei - das ist Wahnsinn ... Das ist schon eine Behinderung in erster Linie, wenn es um Veränderungen am bestehenden Betrieb geht."* (What certainly does not contribute to cost savings is, primarily during periods when changes need to be carried out here, when investments or alterations need to be made to the building, the local authority authorisation process is absolutely hideous. I mean, if you simply want to make changes to one part of a machine, everything else is deemed to have changed because an authorisation permit is required which generates 1 to 3 A4 sized lever arch files and the passing of between half a year to ¾ of a year authorisation time before anything can happen is hard to understand ... in addition, we can draw on our own experiences, where if one discusses these issues with the authorities in advance things appear to work out more smoothly, then once the authorisation permit has been granted and you page through the authorisation procedures and documentation and then you realise there are again between 20 to 50 different forms of procedural documents to go through - that is just madness... That in itself is a key handicap, when considering changes that need to be made within the existing business.) **Director, Packaging**.

The volume of environmental regulations and the frequency of their modification was felt to make maintaining environmental compliance a stressful exercise, especially in the knowledge that competing companies in other countries were not subjected to similar legislative demands. Regulation density was the reason cited for the relatively low number of German respondents with written guidelines covering all environmental legislative requirements, yet what would appear to be a contradicting, significantly high number of responding German firms with workers assigned to environmental tasks and programmes. Environmental compliance in the form of the *UmweltHG*, "*das Gesetz, daß Sie nicht haben*" (the law that you [UK companies] don't have) was described as the stimulus for wide ranging attitudinal change towards corporate responsibility and environmental liability:

> "*[Das Umwelthaftungsgesetz] hat weitreichende Konsequenzen für mittelständische Unternehmen. Nun müssen wir sowohl eine Bertriebs-haftpflichtversicherung als auch eine Umwelthaftpflichtversicherung abschließen. Da die Haftungsrisikos wesentlich erhöht sind, ist es für kleinere Unternehmen sinnvoll, Maßnahmen zur Risikobegrenzung durchzuführen, wie das Öko-Audit*" ([The Environmental Liability Law] has had far reaching consequences for SMEs. Now we are obliged to pay an installation insurance and as well as an environmental liability insurance. Since liability risk has increased considerably it makes sense for small firms to introduce measures such as Eco-Auditing [EMAS] to limit risk.) **Environmental Manager, Plastics**.

In this research only German SMEs verified their environmental management systems through EMAS regulations (Tables 8.24 and 8.25). UK SMEs consistently cited the 'additional' EMAS requirement of the Environmental Statement as the main factor influencing their decision to adopt ISO 14001 standards. Familiarity with and use of the ISO 9000 series added to the attraction of ISO 14001:

> "... I think at the moment I'm quite pleased that we don't have to do that [Environmental Statement] - that's partly why I would choose ISO 14001. The reporting side of EMAS is something that we would find very difficult and time consuming, even though I feel in the future we will have to do that ... companies are being made more accountable for what they are doing - you can see that in the legislation. I feel that at some point in the future you're having to make public your environmental impacts, especially with releases to the atmosphere, water and things like that ... Even with the new IPPC regulations, it may be a while before we are having to implement it fully, but part of that will have waste management issues, energy management issues, control of noise and odour - all these things will be included - it's up to the Local Authorities or the Environment Agency to say what you have to do but that means that you are starting to report on all your impacts ..." **Environmental Manager, Chemicals**.

It would not be entirely correct to equate the above unpreparedness to develop an Environmental Statement with a lack of substantive environmental commitment. The author argues that research findings which report inconsistencies between measured company attitudes towards the physical environment and the activities undertaken by firms aimed at environmental protection have largely failed to explain such outcomes as inevitable consequences of a misalignment between available environmental knowledge or understandings within a social system and institutionalisation values defining practice in relation to this knowledge. At the same time the importance of developing an Environmental Statement is not only linked to the consequences of the critical nature of environmental protection within corporate strategy but also to the fact that many corporate decisions are structural in nature and, therefore, difficult to extricate. Decisions based upon poorly researched or understood information, ranging from process investments through to management practices and controls, unavoidably become subsumed in a number of corporate decisions which may take years to change. Revising such decisions may not only contribute to a lack of company success in terms of financial and manpower costs but in delayed company success which cannot

benefit from the competitive advantages gained from early action. An important benefit of organisational structures which enable coordinated corporate policy formulation and importantly encourage critical corporate review is the creation of consistent, coherent strategies based upon well-argued, comprehensive understandings of company requirements.

For many German companies EMAS represents an opportunity to engage in *Öko-Auditieren* or 'Eco-Auditing', a term which is used interchangeably with EMAS. Ecological auditing exercises emphasise the material, social and economic relations defining all corporate activities, products and services which require no less attention in Environmental Programmes than direct environmental issues themselves. The extensive German EMAS commitment on a national level to date, which is recorded in Appendix Table C.4, can be attributed to institutional influences. The Eco-Management and Audit Scheme has served as the German national environmental management standard and also represents an opportunity to shift the responsibilities of environmental protection control between companies and State institutions more in favour of firms. This move is supported both by German companies, which have consciously developed EMAS programmes and other environmental actors, who desire greater autonomisation of corporate environment practices without compromising legislative standards. During an interview with a German Environmental Adviser the role played by institutional influences in the determination of environmental action and the potential role of EMAS as a surrogate State implement was identified:

> *"In Deutschland wird dieses Thema [Deregulierungsmöglichkeiten durch UMS] nur für das Öko-Audit im Sinne der EG Verordnung, also EMAS, diskutiert. Bei ISO 14001 gibt es in Deutschland sehr viele Vorbehalte gerade auch bei der Politik, weil man dort davon ausgeht, daß das System nicht im vergleichbaren Maße eine geeignete Behördenkontrolle bereitet, weil es letzten Endes die kontinuierlichen Umweltziele nicht miteinbezieht, ja vor allem deshalb, weil diese Ziele der ISO Norm der staatliche Komponent fehlt. Das Vertrauen des Öko-Audits in dem EG Sinne in der Politik in Deutschland kommt von daher, daß es die Zulassung der Verifizier und derer Tätigkeit überwacht wird, letztlich durch staatliche Stellen. Wir haben hier ein System bei Öko-Audit etabliert, wo der Staat schon ein deutliches Wort mitwählt sowohl bei der Zulassung als auch bei*

der Standortsregistrierung und dem gegenüber ist die ISO 14001 eher eine 'land-berat-wirtschaftliche Sache'. Deswegen dreht sich diese Diskussion bei uns praktisch nur um EMAS ... und die Länder versprechen sich davon gerade auch für KMU einen passenden Anreiz beim Öko-Audit mitzumachen... Wir sehen eben das Öko-Audit auch als ein ganz wichtiges Mittel, mit dem die Unternehmen selbst auch zeigen und selbst herausfinden können, wo sie Umweltentlastungspotentiale haben. Deswegen arbeiten wir auch daran, diskutieren wir mit der Bundesregierung und Unternehmen, die sich mit dem Öko-Audit beteiligen, von einigen der etablierten behördlichen Verfahren befreit zu werden, also in einem Sinne einer Deregulierung, nicht um den Umweltschutzstandard abzusenken, sondern das Umweltschutzniveau zu erreichen mit weniger Bürokratie, denn es ist schon so, daß gerade kleine Unternehmen in Deutschland von vielen der Verfahren, die wir in den letzen Jahren geschaffen haben einfach sehr stark belastet werden durch enorm viel Papierarbeit, durch lange Genehmigungsfristen und so etwas und da kann man was ändern... Die Öko-Auditverordnung legt ja fest, daß man mindestens so viel tun muß, wie das Gesetz vorschreibt ... was wir vorschlagen, ist, daß der deutsche Gesetzgeber oder Gesetzgeber gegebenfalls auch in den Bundesländern sagt „wenn jemand bei mir in meinem Bundesland ein Öko-Audit gemacht hat, hat er damit bewiesen, daß der die hier am Standort gültigen Umweltvorschriften im Eingang einhält" und das heißt, die Behörden brauchen das nicht mehr in dem Umfang zu kontrollieren, wie sie das bisjetzt getan hat..." (In Germany this issue [the possibility of deregulation through EMS] is only discussed in relation to the Eco-Audit in the sense of the EU regulation, namely EMAS. There are very many reservations concerning ISO 14001, especially in the policy arena since it is felt that ISO 14001 does not provide for, in comparative terms, appropriate Local Authority controls, because in the final analysis it does not include a provision for continuous environmental goals, above all because the goals of the ISO standard lack the State component. There is trust in the Eco-Audit in the sense of European Union and German policy framework given that the authorisation of the verifiers and their activities is monitored, ultimately through State agencies. In Germany we have institutionalised a system with the Eco-Audit, where the State exercises voting powers which co-determine authorisation and site registration practices, whilst ISO 14001 is more a '*Bundesland* - Consultancy - Economic' issue. This is why the German [environmental management system] discussion only evolves around EMAS ... and the *Bundesländer* are expected to provide SMEs with appropriate incentives to conduct an Eco-Audit... In fact, we see the Eco-Audit as quite an important medium, with which enterprises can themselves display and establish where their potential to environmental savings and gains can be found. This is why we are working towards, in liaison with the Government and companies with an Eco-Audit, the release from a few of the conventional processes of Local Authorities, in the sense of a deregulation, not with the effect of lowering environmental standards, but reaching the same environmental levels with less bureaucracy, since many of the small enterprises in Germany have been burdened by exorbitantly high levels of paper work, through long waiting periods before the granting of authorisation permits and the like and it is there where things can change... The Eco-Audit Regulation decrees that one has to at least do as much as prescribed in legislation ... we are suggesting that the German legislator or the respective legislator even in the *Bundesländer* says "whoever has undergone an Eco-Audit here in my *Bundesland* has by definition proven that the relevant environmental documentation and procedures have been completed and upheld" and this means the Authorities need no longer to control to the extent that they have done until now...) **Environmental Affairs Expert, *BDI*.**

The comparatively higher rates of German respondents producing environmental statements in this research also serves to illustrate the extent to which corporate environmental consciousness in the form of commitment and action needs to be qualified by institutionalisation factors. Existing legislation governing environmental practice in Germany discussed in Chapter Four, in relation to the administrative controls on waste management and environmental media installations in addition to the application of BAT, embodies the fundamental elements of the EMAS regulation. Subsequently UK firms aspiring to the meet the requirements of EMAS have confronted regulatory challenges which transcend the legal boundaries set by existing UK legislation but which are *de facto* requirements of German environmental legislation. The evolution of corporate environmental management in the UK and Germany has been particularly shaped by the unpreparedness of the UK Government to accept more prescriptive environmental standards and regulations during the late 1980s and early 1990s presented by the European Union and the full endorsement of these standards and regulations by the German State. As discussed in Chapter 6.1.3 a more crucial influence on this development than the outworking of 'national cultural consequences' was the philosophical opposition of the then Conservative Government to the far-reaching environmental regulations and impositions by the European Union. In contrast, the application of the *Vorsorge* principles in the German *Strukturpolitik* through environmental regulation such as the *UStatG*, the *KrW-/AbfG* and the *UmweltHG*, has stimulated environmental research and manufacture, through which German firms, as initial market entrants, can secure competitive advantage, reflected to some extent by the number and nature of German environmental protection product patents[158] and measures undertaken by State-driven business support organisations to secure competitive advantage (UBA 1999). Legislative change has also engendered a conceptual or environmental grammar predicated on the assumptions and anticipations of regulatory frameworks which also define the extent of ecological communication. This was most noticeable during interviews in German responding

[158]Refer to Appendix Tables C.5 to C.8 detailing international environmental patenting orientations.

firms generally critical of the pace of environmental progress and evident only amongst UK SMEs with or contemplating EMS use and also implied by the (German) environmental professional response to the opportunities for ecological change offered by the '*Vorsorge*' and 'Polluter Pays' principles plus environmental instruments. Integrated environmental protection is effectively achieved only through BAT which is the central operational principle of EMAS. The environmental concessions enjoyed by the UK prior to the implementation of the European Directive 96/61/EC can be described as unofficially debarring large proportions of UK enterprises from EMAS by virtue of their 'commitment' to institutionally-driven BATNEEC principles. The absence of UK SME verified EMAS management systems is not surprising in the context of these factors. It can be anticipated that the introduction of the EU Directive 96/61/EC into the UK's legislative framework and the adoption of BAT as the single mediating standard will provide the basis for a commitment to EMAS which had hitherto not existed in the UK[159].

The frustration expressed by some German interviewees regarding the weakness of both EMAS regulation and ISO 14001 as arbiters of high environmental standards is rooted in its interpretational licence and the limited ecological rigours over and above existing national standards that (German) firms will encounter if they chose not to develop their corporate environmental consciousness:

> *"... Der Mangel an einen einheitlichen Standard stellt eine Schwäche für die Umwelterklärung dar, die oft diskutiert wird. Die meisten Firmen benutzen sie nur als Konsolidierungsinstrument, das ihnen Sicherheit gegenüber den Behörden bereitet .... [Solche Firmen] bieten der Öffentlichkeit und sich selber nichts Neues an."* (The lack of a uniform standard [in the application of EMAS] weakens the value of the Environmental Statement. This issue is often discussed. The majority of firms use the Environmental Statement as a consolidation instrument which makes them safe as far as the authorities are concerned ... such firms offer the general public and themselves absolutely nothing new.) **Environmental Manager, Beverages**.

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[159]The operational transition from BATNEEC to BAT has thus far proven to be challenging for most UK applicants requesting IPPC permits. The main difficulty lies in coming to terms with the extended conceptual demands of application permits, which require a technical description of any new installations used, a justification of their use, an explanation of ensuing operational improvements and a summary of operational improvements planned through BAT installations and techniques (ENDS 2001m).

Such comments are equally indicative of the high anticipation shared by some environmentally conscious firms and the incomplete institutional frameworks for the exercise of ecological practices in keeping with sustainable development:

> *"... Sie [Die Kreislaufwirtschaft] ist unvollständig. Es gibt zur Zeit keine gezielte Recyclingstrategie für die Aufarbeitung von Altprodukten - die wirtschaftlichen Anreize sind momentan zu schwach und es gibt keinen Markt für die Weiterverwendung... wir sind ganz am Anfang der ökologischen Modernisierung, wie Sie das nennen..."* ([The Eco-Cycle Economy] is incomplete. There is currently no real targeted recycling strategy for the take-up of old products - the economic incentives are too weak for the time being and there is no market for reused materials... we are right at the beginning of the ecological modernisation, as you have called it.) **Company Manager, Machinery**.

> *"... Verluste haben wir nicht gemacht aber wir haben keine Vorteile - wir haben ja Wettbewerbsvorteile davon erhofft, daß wir Umweltaudit haben und der Gesetzgeber verlangt umweltfreundliches Arbeiten aber er hält sich selbst überhaupt nicht daran - der Gesetzgeber benutzt auch noch heute den billigsten Betrieb und egal ob er seine Chemikalien ordnungsgemäß auskippt, sondern geht praktisch davon aus, "wo kann man 3 Mark sparen?" - der billigste kriegt den Zuschlag und nicht den umweltfreundlichen Druck!"* (... We haven't made losses but we haven't made any advantages - we were expecting to secure competitive advantages given that we perform environmental audits and the Legislator demands [State agencies demand] environmentally friendly operations but the Legislator doesn't [State agencies don't] uphold those standards - right up to this point, the Legislator still uses the cheapest firm, regardless of whether it disposes its chemicals exactly as the law requires but instead the Legislator bases the judgement on "where can I save 3 DM?" - the cheapest firm gets the contract and not the pressure to adopt environmentally friendly practices!) **Company Owner, Printing**.

> *"Umweltprobleme und Ihre Lösung sind, wie Sie wissen, vernetzter Natur und Verhaltensänderungen setzen die Bereitschaft von Veränderung voraus... Die Prozeßkette verlangt Zeit."* (Environmental problems and their solution are, as you know, interconnected and behavioural change is dependent upon the preparedness to change... This process requires time.) **Environmental Manager, Chemicals**.

The author contends that criticism of the variability of EMS registration requirements is an unavoidable consequence of the application of subsidiarity and proportionality principles within the European Community. It can also be argued that the elements of legislative diversity adds to certified and verified EMS accessibility to a wider range of companies as illustrated by the demand for Quality Management Systems.

Table 8.26 indicated an 18% increase in corporate environmental improvements beyond current levels on the part of German SMEs with environmental management systems compared with a 4% increase in commitment to environmental improvements beyond current levels on the part of UK SMEs with environmental management systems compared with UK companies without an environmental system. The low increase in enhanced environmental commitment may be indicative of the exclusively cost saving, liability minimising rationale driving the majority of UK SMEs. Notwithstanding the low percentage levels of environmental commitment beyond existing levels, the lack of further environmental commitment on the part of UK SMEs may also suggest less applied environmental management on the part of companies certified to the ISO 14001 standard compared with the more stringent regulatory requirements of EMAS. When asked about the low uptake of certified or verified environmental management systems amongst SMEs interviewees often alluded to what can be described as conventional SME weaknesses (Poole et al 1999). These relate to a lack of information, pecuniary and social capital in addition to a lack of time. Information shortcomings are linked to a lack of appreciation of the benefits of auditing systems. The claim was made that SMEs are often unaware of the specific financial support they can receive when introducing environmental management systems and conducting environmental audits. SMEs may also be deterred by opportunity cost factors or their lack of financial buoyancy, the degree of which directly correlates with environmental commitment (Table 8.27). Quantitative and qualitative personnel limitations were also cited as undermining information collation and evaluation capacities of smaller companies and, therefore, the ability of these to make well-informed strategic decisions on the benefits of EMS:

> "... If there was some incentive that encouraged businesses to embrace environmental requirements, be they support, some percentage support for expenditure associated with achieving segregation, etc. This company would readily accept some financial support to enable us to achieve the relevant registrations." **Engineering Director, Machinery**.

> *"... verständlich informieren mit Checklists - halt das und das machen und durch die Stelle kann man das und das tun - so daß es wirklich einfach wird, weil für kleine und mittlere Unternehmen ist es schon schwer am Markt zu bestehen und insofern ist es dann schwer sowas einzuführen und wenn der Grund dafür nicht sofort gesehen wird, dann wird es auch nicht passieren ..."* (... provide comprehensive information check lists - outlining how to do this and that and achieving this and that by doing this task - so that it is really simple, because surviving in the marketplace is already hard enough for small and medium-sized enterprises, so it is particularly hard introducing something like this and if the reason for it all is not immediately seen, then it just won't happen.) **Company Director/Company Owner, Machinery**.

Some companies called for greater involvement of business support organisations in the provision of information designed for smaller firms through which the real benefits an EMS can be understood:

> "... it [the value of environmental commitment] needs to be proven, particularly to smaller companies. The medium-sized companies are probably less of a problem, but for the smaller companies it needs to be showed to them that they can actually get some financial benefit out of undertaking environmental improvements. There is still to a certain extent a view that all environmental improvement does is cost you money - now that basically isn't the case and there are a number of schemes - ETSU, the Environmental Technology Best Practice Programme, who are people who deal with waste management and so on, who can actually lead firms into doing certain things which can help them reduce their overall costs quite dramatically.... There must be a perceived benefit for SMEs. It is difficult for them sometimes, particularly where they do not have individuals who specifically have a responsibility for the environment to actually take these things on board. A lot of these things float across peoples' desks and they don't have time to read them. The advantage of having an EMS in place is that usually somebody is responsible for getting into this sort of thing and looking at it and making decisions and making recommendations, without that, it's often the Safety Manager, and he's probably got more important things to worry about." **Quality Systems Manager, Food**.

Some firms voiced the view that the poor design of environmental management systems in general and the lack of clarity of EMAS in particular were factors which discouraged the use of environmental management systems by more SMEs. It was generally felt that the classic management system format of the regulation was attuned to larger organisations with departments and personnel acquainted with management systems. This led some interviewees to question whether it would be wise for SMEs, without environmental or quality management system experience, to implement EMAS in its current format. The quoted Environmental Affairs Expert outlined key reasons why measures to simplify EMAS for specific business sectors have been largely resisted:

> *"... Eine erleichterte Variante aber, unsere Befürchtung ist daß dann eine sozusagen 'zwei-Klassen Gesellschaft' entsteht... Ich denke es sind nicht die inhaltlichen Anforderungen - also, was man beim Öko-Audit machen muß, für KMUs das Anspruchsniveau abzusenken, sondern ich denke es kommt darauf an, wie man das macht. Ich glaube, daß die Großteile der Probleme, gerade bei kleineren Unternehmen, daher kommen, daß auch viele Berater, viele Umweltgutachter zu leichtfertig Verfahren übertragen, die vielleicht bei großen Unternehmen zweckmäßig sind aber die Bedürfnisse von KMUs nicht treffen, also ich denke, es kommt darauf an, wie man die Vorgaben implementiert und das man da pragmatisch vorgeht. Ich denke, es ist mehr die Tätigkeit bei der Einrichtung des Systems und bei der Zertifizierung und Verifizierung - nicht zu sehr die inhaltlichen Anforderungen selbst. Ich denke auch ein kleines Unternehmen kann sicher Ziele setzen und die Einhaltung dieser Ziele überwachen und vernünftige Verfahrenswege auch treffen, damit der Umweltschutz vernünftig läuft."* (Our fear is that an easier variant would lead to a so-called 'first and second class environmental society'... My view is it is not the detailed requirements that one needs to change in EMAS, sinking the requirements SMEs need to attain, but rather it depends upon how it is done. I believe that many of the problems, especially those encountered by smaller enterprises are the result of many consultants, many environmental verifiers introducing processes in a thoughtless way, which might perhaps have a purpose in large enterprises but do not satisfy the requirements of SMEs, basically I think it all depends upon how the procedures are implemented and how pragmatically these are carried out. I think it is more an issue of the setting up of the system and certification and verification of the system and not an issue of detailed requirements. I also think a small enterprise can easily set targets which can be monitored and meet sensible procedural objectives in order that environmental protection can operate sensibly.) **Environmental Affairs Expert, *BDI*.**

The above comments are affirmed by the following experience which underscores the importance of pragmatic employment of EMS standards and regulations:

> "... But again we were having to ask ourselves the question, "what was the environmental sense in that?" Another problem was raised about fire - we've got a sprinkler system. They asked ".... so what happens if there is a fire?", we said "- the sprinkler system goes on, the fire brigade come and off they go" the accreditor then asks "so what do you do?" and we said "Well, we will inform Anglia Water for insurance reasons as well, and when Anglia Water comes, they are going to do something.." - we've done our duty - we've reported pretty damn quick and to us, we couldn't think of anything else to do environmentally on the spot, apart from tell the Authorities pretty quick. Then they went on and on about water courses, maybe building dry ponds for it to be caught into, and this kind of stuff which is totally out of the question really - we spent a long time speaking to them about this and in the end we said nothing and let the talk subside." (Second speaker) "After exploring the dry pool route with them then they asked us whether we could think of anything else and we said not that we could think of, then they said, "what about the smoke emissions from the fire?", so we asked them - "what have we got to do then - build a frigging great chimney over the building in case the place burns down so that we could emit the fumes out the top of it?!!..." We were finding it hard to cope with it all, for goodness sake, but that's really where they were leading; then they gave us an example of a big multinational foreign company ... which was near where they were based, and when the company built that plant they literally had done that - they had specific dry ponds, emission things

> over the building in case the building was burned down and so on.... but none of that was relevant to us." **Environmental Manager, Health and Safety Manager, Packaging**.

Other respondents with management system experience argued that the procedures and principles of an environmental management system would provide SMEs with management structures promoting greater in-house professionalism and a comprehensive means to increase company survival:

> "I think the benefits outweigh the costs. I'll give you one good reason why that is going to become even more true because it looks as though that once IPPC comes in and we are paying the Environment Agency to come in and audit our site, one of the criteria determining auditing frequency they will use will be whether or not you've got an EMS in place, so if they come in once every 2 years instead of once a year, then you're saving yourself a substantial amount of money, and I think that will hugely outweigh the costs of keeping the system running ... In retrospect I don't think there is any much that I don't see the point of. Sometimes you look at some of the procedures and you say "I wonder why that's there", but I think as we have got a better understanding of why the EMS is structured the way it is, I don't think there is anything I can particularly say that "I don't like that"; we didn't particularly like Continuous Improvement when we first had it, but as I said that was because we didn't totally understand it. As we got better used to it our understanding of it and way of dealing with it has worked reasonably well. As for the Quality System, once you understand why the constraints are there, then you live with them". **Quality Systems Manager, Food**.

The above view of the EMS as a potential environmental cost saver through time otherwise lost resulting from visits of Environmental Authorities and related financial audits was also endorsed by German interviewees. The majority of companies interviewed with certified and verified environmental management systems stressed the value of the regulation as a tool for measuring their ecological performance as well as presenting data, which could be used to measure and improve the levels and quality of incoming and outgoing material or energy flows (Chapter 8.2.3.1). Auditing offered interviewed companies measured flexibility given that it can be conducted as a stock taking audit, on the basis of inputs and outputs, as a product audit, on the basis of consumption or as a process audit. For such firms environmental management systems had less to do with legislative conformance as such but the complete examination of input and output streams affecting enterprise activities:

> "We didn't actually know how much waste we were producing so what we've done now is spent the last 3 or 4 months setting up monitoring system using production sheets and we can now on a week to week basis observe our waste flows per product type, for each machine, per shift and synthetic formulations, etc and I suppose that is an environmental goal in that we're trying to reduce the amount of waste but it's also a business factor in that we're trying to keep the costs down." **Environmental Manager, Plastics**.

> *"Die Einhaltung aller umweltrelevanten Auflagen, Gesetze und Verordungen ist für uns eine Selbstverständlichkeit. Darüber hinaus werden alle notwendigen Maßnahmen ergriffen, um Umweltbelastungen zu vermeiden bzw. zu beseitigen. Wo dies nicht zu bewerkstelligen ist, ist es unser Ziel, die Umweltauswirkungen und das Abfalllaufkommen auf ein Mindestmaß zu verringern und mit Energie und Rohstoffen schonend umzugehen.* (Maintaining environmentally relevant documentation, laws and regulations is second nature and beyond that all necessary measures are taken to reduce and remove waste pollution. Where this cannot be achieved it is our aim the reduce these impacts and sources of pollution and waste to an absolute minimum and to carefully use energy and raw materials.) **Company Manager, Machinery**.

The impact of certified and verified EMS implementation is indicated in Table 8.58 which compares the environmental measures considered to be of current importance to firms without and with a certified or verified EMS. Table 8.58 supports the qualitative company studies in Chapter 8.2.3.1 which demonstrated that the certified and verified EMS can provide an effective structure and encourage a cultural context within which environmental protection measures are developed and improved beyond previously existing corporate levels.

Table 8.58: Important Environmental Measures (Firms Without and Firms with ISO 14001/ EMAS)

Environmental Measures of Current Importance	UK %		Germany%	
	Without	ISO EMAS	Without	ISO EMAS
Energy saving and improving Energy Efficiency	89.0	100	85.2	95.7
Environmentally-oriented transport (of raw materials)	29.4	62.5	52.3	65.2
Reuse of Waste Materials	72.5	87.5	75.6	82.6
Avoidance/Minimisation of Waste	89.0	87.5	84.3	82.6
Water and Effluent reduction	61.5	62.5	76.2	91.3
Dealing with water-damaging substances	44.0	62.5	74.1	82.6
Control and reduction of emissions	68.8	100	64.0	73.9
Changing existing production processes	49.5	75.0	37.2	47.8
Creating environmentally suitable products	41.3	75.0	58.6	65.2
Ecological product development	27.5	25.0	48.3	60.9
Improving the environmental practices of contractors and suppliers	36.7	75.0	31.4	43.5
Preventing and restricting environmentally-damaging accidents/disturbances (providing danger safeguarding mechanisms)	80.7	100	73.3	78.3
Providing personnel with information and training regarding ecological issues	45.0	87.5	42.4	69.6
Improving technical equipment	65.1	75.0	73.8	87.0
Environmentally sensitive purchasing	37.6	50.0	62.8	78.3
Reinforcing control of environmentally relevant activities	51.4	100	52.0	78.3

The increased focus of UK SMEs on environmentally-oriented transport and German SMEs on reducing water use and effluent reduction is demonstrated in Table 8.58. Firm evaluation of the importance environmental measures may be indirectly or directly influenced by economic instruments such as the Climate Change Levy and *Ökologische Steuerreform*. Legislative change may also influence evaluations of environmental investments, such as additional emissions control and duty of care responsibilities exercised on site, including wider ranging accident control procedures stipulated by PPC regulations previously discussed in Chapter 8.2.4. With few exceptions higher commitment to environmental measures were recorded against UK and German firms with ISO 14001 or EMAS than without the use of these management systems. The use of ISO 14001 did not prompt more UK SMEs to pursue ecological product development strategies. The number of UK and German firms committed to waste avoidance and minimisation measures marginally decreased within the cohort of firms with ISO 14001 and EMAS. This could be attributed to the fact that waste avoidance and minimisation

strategies are 'popular' pursuits of a wide range of firms which may feel they have exhausted opportunities to further apply waste saving measures to their products and processes. Diminishing scope for corporate environmental improvements was described as an inevitable consequence of the continuous improvement processes within ISO 14001 and EMAS. Two quotations illustrate, firstly, the comparative limitations of economic instruments to engender change, implicit in the claims of environmentally conscious German SMEs which described environmental legislation as having reached the limit of its effectiveness, and secondly the comparatively reduced quantitative opportunities to display environmental credentials through the Environmental Statement:

> "... Well yes, I think things like the Landfill Tax, Climate Change Levy, etc, are going to have an effect - once you start paying a penalty on using electricity, if you like, it does tend to concentrate the mind on finding ways of saving. However, it's not as simple as saving. I think that one of the problems with it is although they say all these things link to together - if you look at the Polluter Pays Principle, industry in general does not sit there and say "oh good, let's go and waste a load of money by using loads of electricity" any more than they like throwing money away on packaging because it costs them money in the first place and in the current market we are all trying to work at the lowest cost. I think the ability of a company to reduce their electricity is not great. We've been running a combined heat and power plant here for about 10 years now, which is considered to be the most efficient way of producing electricity, but we are still going to get caught under the penalties for using it, but there are not a lot of alternatives. For much of industry, with the amount of electricity we use, we use that amount because we simply have to, not because we like spending money..." **Quality Systems Manager, Food and Beverages**

> *"... Der Vorgang ist, daß wir schon seit 10 Jahren hier Umweltschutz betreiben, daß wir unsere Chemikalien seit 10 Jahren ordnungsgemäß entsorgt haben, bevor sie überhaupt an Umweltaudit gedacht haben, während andere Betriebe das praktisch als Marketingmasche erkannt haben und ganz plötzlich auf diesen Zug aufgesprungen sind und dann natürlich da von 0% auf 100% Erfolge vorweisen können - das können wir, wenn wir das also schon seit 10 Jahren machen, natürlich nicht - hier ist der Sprung ja nicht so groß ..."* (... The fact remains that we have been practising good environmental management for over ten years and have disposed our chemicals in accordance with the law throughout this period before the idea of EMAS was ever thought of, whilst other companies just see it as a marketing gimmick and as quick as a flash jump on the bandwagon and not surprisingly can demonstrate 0% to 100% [environmental] success - of course, since we have been doing this for the last 10 years, we haven't been able to do that - here our improvement is not so great...) **Company Director, Printing**

It has been argued that the intention of the EMAS regulation to assist in the restoration of market signals by promoting environmental competition has faltered primarily because of the market's failure to attract a critical mass of companies to participate in environmental competition, coupled with insufficient levels of information through which producers and consumers can reach measured decisions qualified by environmental understanding (Hillary 1997, pp. 333, 334). This point may be valid in the longer term. Yet the diverse views in relation to the value of certified and verified environmental management systems voiced by firms with different business experiences would suggest the existing EMS frameworks of EMAS and ISO 14001 are not without benefit to SMEs. The Corporate Environmental Consciousness Model used in this study indicates knowledge of EMS elements is fairly high. The EMS framework also forms part of an institutionalisation process which it informs through, for example, the introduction of new operational methods to business enterprise and is informed by institutionalisation processes such as BAT through which the continuous improvement principle is explicit.

Despite generally high levels of environmental knowledge most interviewed companies conceded that they had either environmental knowledge deficits or accepted that increasing current levels of such knowledge was necessary in the face of ongoing legal and business change. Two interviewees described their management practices as 'ridiculous' in that the ongoing costs associated with hiring a long-term consultant would be radically reduced if staff were provided relevant technical and managerial training:

> "... if the management would just invest in one or two members of staff through training!" **Environmental Representative, Health and Safety Officer, Printing**.

An important difference in the corporate cultures of UK and German SMEs is the presence of the legally defined role and position of the environmental *Beauftragter* or 'Officer' in the German manufacturing firm. A German Environmental Officer is

only described as such after receipt of specific and expert training in technology use and legislation relevant to the particular type of environmental role to be performed by the Environmental Officer in order to guarantee all relevant corporate environmental regulations and liability issues are addressed by German firms, including SMEs[160]. The existence of such a person guarantees technical and legislative knowledge is resident within each firm with environmental liability responsibilities; environmental knowledge in companies without such an officer may be diffused, as has been the experience in the company of the following respondent:

> "... Because we don't have a custodian of environmental issues as such and recognising that it [environmental protection legislation] is a moving beast we would say that we have a general awareness and when a specific issue comes up we would have to investigate so I would have to say we have an awareness, not familiarity." **Manager, Machinery**.

The existence of the *Umweltschutzbeauftragter* determines relatively high levels of expertise will even be available in German SMEs which attempt to suppress the impacts of institutional dynamism by arresting the rate of change to in-house environmental and ecological processes. Where additional training is required, provisions for the *Mittelstand* can be satisfied through the financial packages discussed in Chapter 6.3. There is also evidence of SME 'Pooling' on a corporate level, whereby small firms bundle their collective resources to secure economies of scale in the ecological management of raw materials and on an institutional level, thereby accessing expert environmental consultancy at affordable prices (UBA 1998b, UBA 1998c). In German interviews questions regarding compulsory training were often considered not to be relevant since acquiring skills through official environmental training courses based on uniform standards is to date not a problem of German industry nor are problems related to course availability or suitability for the *Mittelstand*. The UK response to this question was 'yes, some form of compulsion should be introduced' but many UK respondents also felt such a system would encounter difficulties monitoring the quality of company training:

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[160]Refer to German environmental training in Chapter 6.4.

"Do you think that the importance of corporate environmental performance should be reinforced by compulsory training of staff?"

"Yes - if we are to really make progress in this area then 'yes'. Although difficulties may arise in defining what environmental training is and the quality of such training, in principle it should be made compulsory; voluntary measures will not be taken seriously." **Quality Manager, Machinery**.

"In terms of training being made compulsory I think it would be better if you could link it into an advantage to the company for doing it - the difficulty with compulsory training you'll tend to find is that people will find ways around it and say "Yes, we've done the compulsory training" but they do very little. If you were able to say "Look, there's an opportunity to save 1% of your overheads" or something like that, then people in charge will sit up and take notice." **Quality Assurance Manager, Chemicals**.

Other UK interviewees were more sceptical about enforced training, suggesting that adequate support to assist firms develop environmental skills existed or should simply be encouraged through the use of environmental management systems:

"I don't know how you could have compulsory training because of the cost of it ... If you are encouraging the use of ISO 14001 then training is part of that - I don't know how you could introduce a compulsory system." **Environmental Manager, Rubber and Plastics**.

However, many German interviewees in response to questions concerning environmental training claimed it had not resulted in wide scale ecologically sensitive practices amongst German SMEs although questionnaire results indicated a generally more extensive and often statistically significant environmental commitment to ecologically sensitive corporate engagements on the part of German SMEs (Table 8.36). It was largely felt that these environmental training initiatives had led to a concentration of general knowledge and expertise which can be integrated into corporate practices. Environmental education placed much emphasis on coupling *ökopädagogisches* understanding with technical measures and existing environmental technology but it would appear that acquired knowledge is used defensively. Knowledge is, therefore, predominantly applied to inputs which readily exhibit environmentally-friendly qualities and less to the conceptual reworking of corporate rationales such as products and corporate performance measures.

The difficulties some German firms experience with documenting large levels of regulation may be reflected in claims and concerns raised about alleged breaches in verified EMAS documentation specifications on the part of German companies (ENDS 1998) and calls for EMAS documented programmes, audits and system controls to assume the format peculiar to the ISO 14001 standard. Alternatively the ENDS report may have reflected the more critical insights of a UK audience with its deeper rooted tradition and use of corporate management systems such as the ISO 9001 Quality Management Series, which offers greater theoretical synergy potentials with ISO 14001 than EMAS (Rothery 1995). Research results support the generally held view that Anglo-Saxon firms more widely use the QMS (Table 8.28 - χ^2, r = 21.92, df = 1, p = 0.00000). QMS possession was also directly linked to EMS certification and verification as indicated in Table 8.28. The strong association between QMS usage and EMS implementation complements corporate rationales which aim at integrating ecological strategies within economic frameworks. However, although the principled symmetry between quality and environmental management is mutually inclusive, the author argues that operational and functional objectives in the existing exercise of QM and EM systems can displace or misinterpret this conceptual symmetry with the effect that QM and EM or Health and Safety system integration is primarily defined by their documented union in a manual. This is not to suggest, for example, streamlined documentation, combining environmental legislation and objectives with relevant quality assurance regulations and objectives, does not constitute an integrated system but simply the dimensions of integrated quality and ecological practice encompass much more than the formal unification of documents. Organisation processes, technology, products and services are each candidates for synergetic transformations. Experience with the implementation of management systems provides a structural basis for the organisational aspects of a management system. Research results indicate German responding firms recorded a higher desire for support in this capacity and the UK responding firms recorded a lower level of desire support in this area (Table 8.60: Advice on staff selection and organisation

when introducing environmental programme: UK - 8.7%, Germany 58.6%). However, the author argues that structuring EMS organisation, albeit of fundamental importance, is the least demanding aspect of environmental management implementation. Management systems, including the EMS, are organisational tools which enable their operators to more effectively control the objectives and targets determined by company policy as well as identify weakness in company operations as an outcome of company or site audits and reviews set by company management. Environmental auditing demands detailed understanding of environmental legislation, environmental aspects and technological impacts of social production. Assumed similarities between ISO 9002 and ISO 14001 operation by management lacking expertise in both practices may be at the root of systemic conflicts which surface during attempts to accommodate QMS and EMS structures despite their often different scopes of reference and rationales. It can also be argued that environmental protection primarily shares the same philosophic roots of health and safety practices and integration between these systems may require less abstraction of business processes. The resolution of knowledge deficiencies is of utmost importance in the development of an effective EMS; the ability to introduce or document an EMS will not ensure its success or suitability. The comparative strengths of the German responding firms would appear to be located in the areas of technical expertise and knowledge of relevant environmental legislation (Table 8.60), factors which considerably reduce the likelihood of management system failure. Another important factor which can influence the success of an EMS is its ultimate role within the framework of executive influence and knowledge. Traditional organisational learning processes have been closely linked to the strategic objectives of the firm. However, some business support strategists have attempted to encourage a revised understanding of environmental learning which functions as a continuous communication process that both fosters the democratisation of working relations and benefit from more meaningful operational potentials:

"... In bezug auf die Kommunikation innerhalb des Unternehmens sind wir in Deutschland nach wie vor sehr stark 'Top-Down' orientiert und wenig 'Bottom-Up' oder, sagen wir mal, 'integrativ integriert' und was letzten Endes durch die Öko-Auditthematik impliziert ist... Ich weiß nicht wie es in englischen Unternehmen aussieht, ob man da den Organisational Learning Prozeß kristallisiert hat aber hier in Deutschland ist es doch eher so, daß man einen Umweltbericht macht, eine Umwelterklärung, läßt sich leicht auf möglicherweise zertifizieren, schult die Mitarbeiter gleich eher unter dem Aspekt, wie man Müll trennt oder sonst wie, aber einen wirklichen systematischen Lernprozeß wurde bisher nicht eingeführt... Wir gehen eher davon aus, und das ist unsere Perspektive, daß Umweltproblematik zuerst auch eine Kommunikationsproblematik ist und „Lernen" nicht nur im aufklärischen Verständnis, kann auch Kommunikation über Umwelt initiieren und aus der Kommunikation kann auch gelernt werden... das heißt, wo man sich über das Organisatorische verständigt, über Human Resource Development, über Entscheidungswege, Qualitätszirkel, kann man auch integriertes Lernen aufbauen, das den Unternehmensinteressen dient... Ich weiß nicht wie es in England ist, aber es gibt doch einige Instrumente und da kann man natürlich eine sehr unterschiedliche Perspektive aufbauen, wobei zum Beispiel der Kommunikationsbegriff immer von Marketing abhängig ist. Wir haben hier einen alternativen Kommunikationsbegriff - er geht auf Verständigung - Theorie des kommunikativen Handelns von Habermas, zum Beispiel unter anderem ... Diese Thematik „Mitbestimmung", „Neue Kommunikationsform" usw werden aufgrund der Marktsituation vieler Unternehmen eigentlich erst gar nicht mehr angeschafft, sondern es geht um die Sicherung von Arbeitsplätzen und Wettbewerbsvorteile und nicht zu sehr, sagen wir mal, wirklich um ein neues Paradigma. Es ist eher unsere konzeptionelle Vorstellung ... Operationspotentiale auszuschöpften und eben nicht nur, sag mal, Imagegewinn sondern eine wirklich zielführende Kommunikation zu etablieren, denn wie man sieht, Innovation kommt von ganz anderen Seiten her als nur von oben..." (With regards to communication within the company in Germany we are still largely influenced by 'Top-Down' approaches, not 'Bottom-Up' approaches or should I say 'integrative integration', which is essentially what is implied by thematic consideration of the Eco-Audit... I don't know what the case is in English enterprises, whether [the role played by] the organisational learning process has been crystallised, but here in Germany it is still very much the case that a company produces an environmental report, an environmental statement, gains certification confronting the least challenges it is possible to avoid, likely trains the employees in areas such as, how to separate waste or similar, but up until now no real systematic learning process has not been introduced to the firm... We are working from the premise, and this is our perspective, that the consideration of environmental problems also primarily requires a consideration of communication problems and 'learning', not just in the instructional meaning of the word, can initiate communication about the physical environment and learning can be derived from this communication... that is to say, where one reaches an understanding of what the organisational means, about Human Resource Development, about decision making approaches, quality circles, it is then possible to form integrated learning which serves corporate interests... I don't know what it is like in England but there are a range of instruments through which of course a very diverse perspective can be developed, although, for example, the communication concept is always dependent upon marketing. We have an alternative communication concept here - it is concerned with understanding communication - the theory of communicative action by Habermas, for example, amongst others... Consideration of themes such as 'co-determination', 'new forms of communication', etc, are not being taken on board because of the market conditions many firms are having to face, the themes dominating their

> minds are more likely to be securing employment and competitive advantage, not so much, shall we say, a new paradigm. It is rather our conceptual idea ... to draw out operational potentials and not just, let us say, image gains but to institutionalise a real sense of goal oriented communication, for as one can see, innovation has many points of entry into a firm than simply the top.) **Environmental Research Manager, *UBA*.**

These themes are not new within UK environmental contexts (Emerson and Welford 1997a). However, the sentiments of the above interviewee from the *UBA*, whilst not confirming new institutional measures, reflect a desire to introduce communicative action rationales throughout the processes of EMS implementation and compliment the extended objectives of EMAS[161].

Survey results would appear to suggest that works council contributions in environmental issues are low (Tables 8.29 and 8.32). In German interviews, however, the impact of the *Betriebsrat* was described as being significant, but indirect, operating as a means of problem resolution, training facilitating or was concerned with financial and high level technical matters tangential to the specific objectives of EMS development. Project teams were also used to implement the environmental system and in order to prevent possible misdirection of ideas or resources, an external adviser was often included. In this way the knowledge and experiences on all company levels could be activated and effectively used. The important role played by the *Betriebsrat* should not be underestimated. In German companies interviewed, in which information on the merits of the works council was not volunteered, the company enterprise committee or other fora spawned from these, appreciation was generally expressed about the conciliatory functions of these apparatus. It was also difficult to divorce the statistically significant low levels of conflict experienced between management or workers in German responding firms from the effective operation of the *Betriebsrat*. Analysis of Tables 8.32 and 8.33 strongly suggests that the *Betriebsrat* structure positively contributes to conflict resolution during EMS practice. In Table 8.59 problems associated with EMS implementation are listed as in Table 8.33 and divided into three further data categories, namely, whether firms (i) do not use works councils for environmental

[161] Refer to EC Regulation No 76/2001, Annex I(B.4).

purposes, (ii) use works councils which are directly involved in the development and implementation of corporate environmental measures, and (iii) the number of firms using a works council or committee which experienced EMS problems as a percentage of the total number of works council users. No forms of conflict were recorded amongst German SMEs using the *Betriebsrat* or *Betriebsausschuß*. Less German SMEs using the *Betriebsrat* were associated with EMS problems than those German firms not using this structure and envisaged less problems in relation to EMS implementation compared against UK SMEs using work council or factory committee structures.

Table 8.59: Problems with EMS Implementation in relation to Works Council and *Betriebsrat* (Companies with EMS)

Problems envisaged in relation to EMS Implementation (Companies with EMS)	**Use of Works Council / Factory Committee (%)**		
UK SMEs:	**No Use**	**Use**	**% of WC Users**
Problems associated with organising personnel	26.1	30.4	70.0
Conflicts with other Management Systems	17.4	8.7	30.0
Extra Work for Staff	21.7	30.5	70.1
Resistance on the part of Management	17.4	13.0	30.0
Inconvenience in the face of additional responsibilities	17.4	21.7	50.0
Increase in company costs	39.1	13.1	30.1
Resistance on the part of Company Directors	8.7	4.3	10.0
Environmental Information and Training Needs	17.4	13.0	30.0
Opposition on the part of the workers	13.1	13.0	29.9
An overburdening Requirement to produce Information	13.0	21.8	50.1
Too limited Support from outside the Company	0.0	4.3	10.0
German SMEs:	**No Use**	**Use**	**% of WC Users**
Problems associated with organising personnel	34.3	6.3	28.6
Conflicts with other Management Systems	34.4	9.4	42.9
Extra Work for Staff	46.9	15.6	71.4
Resistance on the part of Management	18.8	0.0	0.0
Inconvenience in the face of additional responsibilities	18.8	0.0	0.0
Increase in company costs	31.3	3.1	14.3
Resistance on the part of Company Directors	6.3	0.0	0.0
Environmental Information and Training Needs	34.3	6.3	28.6
Opposition on the part of the workers	15.6	0.0	0.0
An overburdening Requirement to produce Information	6.3	0.0	0.0
Too limited Support from outside the Company	6.3	0.0	0.0

As was detailed in Chapters 6.2 and 6.4 the bond in the system of labour relations between influential German trade unions and works councils has led to the development of innumerable information networks which contribute to the stability of the vocational training and education system. The inclusion of works councils in the process of educational standardising ameliorates the potential conflict between trade unions, which represents both low and highly qualified workers, and works councils, which may gravitate towards the interests of higher qualified personnel. The value of the *Betriebsausschuß* structure was highlighted by the following interviewee:

> *Sie haben vorher von Organisationsproblemen gesprochen, die diese Firma durch den Betriebsausschuß vermieden haben* ....(You previously spoke about organisation problems which this firm was able to avoid through its Works Comittee...)
>
> *Richtig. Der Ausschuß war eine sehr wichtige Voraussetzung, daß wir [während der Einführung von EMAS] keine externe Unterstützung benötigten... Eigentlich hatten wir schon vorher die Umweltschutzarbeit systematisiert. Ich kann Ihnen vielleicht etwas zeigen .... [präsentiert Dokumentationen] ... Das ist unser Managementsystem - wir haben es auf einer Umweltschutzorganisation aufgebaut, auf einer Umweltpolitik und auf dem Umweltsystem selber - Das sind die Details ... [erörtert Umweltphilosophie und Praxis des Unternehmens]... Für alle diese Bereiche haben wir Umweltschutzbeauftragte und jeder ist für einen Standard zuständig... Wenn es ein Problem gibt, muß der Umweltschutzbeauftragte den oder die Verantwortlichen beraten in allen Umweltschutzbelangen, nicht nur den Leiter des Standortes, sondern alle die in der Verantwortung stehen. Zwar mit der Beratung kann es dazu führen, daß Investitionen notwendig sind, das es Geld kostet. Es kann auch sein, daß der Umweltschutzbeauftragte sagt "hier haben wir ein ganz aktuelles Problem" - höchste Gefahr, zum Beispiel, und der Leiter sagt "Ja, aber im Moment haben wir kein Geld" dann hat er ein Problem. Obwohl der Leiter etwas verantwortet, wird es gleichzeitig aber auch hier oben [weist auf das Organigramm hin] bei der Geschäftsführung verantwortet - aber die Geschäftsführung weiß halt nichts davon. Wenn der Staatsanwalt käme, würde sie angeklagt an Organisationsverschulden - falscher Mann - also, hat er [der Umweltbeauftragte] die Möglichkeit sich im Ausschuß äußern und ich habe die Möglichkeit nach oben alles zu berichten. Das ist ein sehr interessantes Ausschußorganisationmodell, das dafür sorgt, daß Umweltschutz hier ernst genommen wird.* (Correct. The Committee was a very important prerequisite which determined that we did not require external support [during EMAS implementation]. In fact we had previously conducted our environmental protection work before EMAS. Perhaps I can just show you something ... [presents EMS documentation] ... This is our Management System - we developed it on the basis of our environmental protection functions, environmental policy and environmental system itself - these are the details ... [discusses firm environmental philosophy and practice] ... For all of these areas we have an Environmental Officer and each is responsible for maintaining a uniform standard ... If there is a problem the Environmental Officer will need to consult his superior in every area of environmental protection and not just his immediate superior on the site but all who share environmental responsibilities. It may transpire

through such consultation that investment is required, that money needs to be spent. The Environmental Officer might well say "we've got a pressing problem here" - extreme danger, for example, and the superior says "Yes, but we haven't got any money for it for the time being", then he has a problem. Although the superior shares some responsibility, responsibility is also carried up here [refers to organisation chart] with the company executive - but they haven't a clue what is going on. Confronted by the public prosecutors, they [company executive] would be found guilty of corporate damage - but it would be entirely wrong if the company executive carried the can... hence the Environmental Officer has the opportunity to express himself in the committee and I have the opportunity to report everything at the top level. This is a very interesting committee structure model, which ensures that environmental management is taken seriously here.

Und dieses Schema - hatten Sie es vor oder nach der Einführung von EMAS? (And this schema - was it in place before or after the introduction of EMAS?)

Das hatten wir vor der Einführung von EMAS entwickelt, ehe wir wußten, daß EMAS und 14001 kommt. Aber wir wußten, daß wir unseren Umweltschutz organisieren müssen, daß wir klare Orientierungen brauchten - wer macht was, wer ist für was verantwortlich..."(We developed it before the introduction of EMAS, before we knew anything about EMAS and 14001. But we did know that we had to organise our environmental protection measures and that we needed clear perspectives - who was doing what, who is responsible for what...) **Technical Manager, Machinery.**

The above interviewee comments illustrate how the works council or committee structure can be used as a conciliatory instrument and an important device to maintain legislative and technical standards or appropriately examine the ecological impacts of company environmental deficits. It can be argued that the lack of UK legislation defining the nature and structure of staff training has served to invalidate the importance of quality staff training whilst the deregulated nature of the education system has created an uneven quality in the output of vocational training services. The inadequate finances made available to vocational institutions reinforce the optional nature of workforce training and indirectly discourages the pursuit of better-option and quality training. The deregulated nature of the labour market provided disincentives to invest in employees and encouraged short-term, free-rider tactics expressed through staff poaching, which in turn encourages the investment in lower skill levels in employees to reduce potential losses. The lack of appropriate levels of technical competence is suggested in the higher requests for technical training by UK respondents in relation to EMS training needs (Table 8.60).

In Table 8.60 the advice requested by UK respondents with an EMS can be described as core issues of environmental management, namely technical advice, environmental programme implementation support and advice on environmental legislation. Although there were approximately double the number of UK respondents who requested advice on environmental legislation was requested the three main issues were advice on staff selection and organisation, in-house staff training and coaching for Company Directors on implementing environmental management which attracted similar interest from UK respondents.

Table 8.60: Environmental Management Advice and Support Anticipated and Requested

Advice Anticipated from Companies without an EMS	**UK %**	**Germany%**
Advice in Technical Area	46.3	33.3
Direct Support implementing the Environmental Programme	47.6	31.2
Advice on Staff Selection and Organisation when introducing/maintaining Environmental Protection at Work	22.0	38.7
Preliminary Advice on Corporate Environmental Management	54.9	29.0
Advising/Coaching the Environmental Management Representative	36.6	23.7
In-house Staff Training	42.7	35.5
External Staff Training	20.7	7.5
Advice on Environmental Legislation	61.0	18.3
Advising/Coaching Company Directors on implementing Environmental Management	34.1	20.4
Comprehensive Measures aimed at Organisational Development	23.2	16.1
Other	1.2	5.4
Advice Requested from Companies with an EMS	**UK %**	**Germany%**
Advice in Technical Area	65.2	31.0
Direct Support implementing the Environmental Programme	52.2	34.5
Advice on Staff Selection and Organisation when introducing/maintaining Environmental Protection at Work	8.7	58.6
Preliminary Advice on Corporate Environmental Management	47.8	34.5
Advising/Coaching the Environmental Management Representative	47.8	34.5
In-house Staff Training	52.2	51.7
External Staff Training	21.7	17.2
Advice on Environmental Legislation	69.6	37.9
Advising/Coaching Company Directors on implementing Environmental Management	43.5	41.4
Comprehensive Measures aimed at Organisational Development	13.0	13.8
Other	0.0	0.0

UK respondents and interviewees confirmed that the main sources of environmental information were the Trade Associations and Governmental organisations, primarily the Environment Agency. Attitudes of both UK and German SMEs towards the provisions of State agencies such as the Environment Agency and the *Umweltbundesamt* were similar. Companies which were less committed to environmental management improvements tended to be less receptive to the efforts of environmental business support organisations to provide financial aid or expert advice, illustrated by company respondents from the UK and Germany:

> "I think the onus is on the company to go and find the information; it doesn't come naturally to the company. I don't remember an instance where we have been told either of a change in the legal status or even best practices through a formal Government Body - we've had to go and find it ourselves.
>
> Fine, so how about fliers - haven't you received fliers from a Government Body?
>
> If we do then they go somewhere else
>
> Should I guess as to where they go?
>
> I couldn't possibly guess not knowing whether they come or not (laugh)
>
> That's interesting, because it could be -
>
> It could be coming into the company secretary who says "There's nothing here for us" and puts it in the bin - that could be happening or I would have to go and ask questions which I can do or someone could be filing them in a big file called 'Environmental' or something and not getting any further - I just don't know..." **Quality Manager, Chemicals**.
>
> *"Erhalten KMUs zufriedenstellende Unterstützung, um Vertrautheit mit Umweltgesetzgebung und Angelegenheiten zu sichern?*
>
> *Nein - ich habe keine Unterstützung bekommen.*
>
> *Gibt es aber keine Hilfestellung durch Ämter wie das UBA?*
>
> *Das Umweltbundesamt - das unterstützt ja nicht. Da kann man anrufen und dann kriegt man Broschüren und das war es ... und das ist deshalb ganz schwierig. Die Hauptaufgabe eines Unternehmens, ist ja nach wie vor, immer noch einige Geschäftsziele und damit wird auch die meiste Zeit verbracht und so etwas einzuführen und wichtigere Dinge einzuführen ist unheimlich schwierig und, wie gesagt, die Informationspolitik ist sehr sehr schlecht.*
>
> *Besteht nicht die Möglichkeit an Informationsquellen zu gelangen, die man danach wirkungsvoll benutzen kann?*
>
> *Ja, es gibt auch Umweltsberater aber das kostet viel Geld und wenn etwas viel Geld kostet, dann muß man den Kosten- und Nutzenaspekt sehen..."*

(Do SMEs receive sufficient support to ensure familiarity with environmental legislation and issues?

No - I haven't received any support

Isn't help available through agencies such as the UBA?

The Environmental Federal Agency - it doesn't provide any support. You can ring it up and then you get brochures and that's about it ... and that is why it is so difficult. The main objective of a company, is as it always has been, a range of business aims and most of the time is spent with those aims, so introducing [environmental management systems] and more important things is very difficult and, as already said, the method of information dissemination is very very bad.

Is there not the possibility of accessing information sources which can be effectively used afterwards?

Yes, there are environmental consultants but that is expensive and if something costs alot of money then one has to carefully consider the cost and benefit aspects.) **Company Director/Company Owner, Machinery**.

Some SMEs aspired towards environmental learning but in the face of limited resources were unable to fully exploit business support services:

"We have access to European Funding for Environmental Training to enable individuals to be trained up to NVQ Level 1 in Waste Management. The original idea was that all individuals receiving training would be from SMEs but because SMEs could not always devote their time it ended up being 50% between SMEs and larger companies ... We had very positive feedback from SMEs originally who said they would be able to commit this time but as the project went on some individuals dropped out as their circumstances changed within the company structure - If somebody's work needed to be covered, they didn't have a choice - that was priority as opposed to attending seminars." **Environmental Advisor, Business Link**.

Other companies which desired to integrate or had integrated environmental management into conventional corporate practices and aimed at enhancing their environmental programmes were positive about agency contributions, as is illustrated by the following discourses:

"Do you feel that SMEs receive sufficient support?

If our experiences are anything to go by then probably yes, in that, as I have just related, we are very much aware and have access to a steady information flow as and when we might need it and at least in this area the Business Link is pretty active in this respect." **Engineering Director, Machinery**.

"... the Environmental Help Line, which is really quite good. We had a disposal question about some CFCs - we had an old fridge and an old air

conditioner and instead of just disposing of them on a tip, we contacted the Environmental Help Line ....I think they like to be used. We had a completely free independent survey on offer to small companies from those guys and a guy came along after we had been accredited and we wanted to have another look just to see whether there was anything we had missed or whether there was anything else that we could do ... and it did not cost us anything and out of that it reassured us that we were on the right track...) **Environmental Manager, Packaging**.

"... Mit Unterlagen werden sie [KMUs] mit Sicherheit gut versorgt aber damit ist es gar nicht gemacht. Gesetze müssen erläutert werden. Die Verbände analysieren umfangreich darum und insofern, wenn die Änderung kommt, werden wir darauf hingewiesen, alles was uns direkt betrifft, darüber werden wir informiert. Aber im allgemeinen muß man sich selbst darum kümmern aber das erfordert natürlich auch sehr viel Zeit und Aufwand." (I do not doubt that they [SMEs] are provided with sufficient documentation but it is not simply a matter of providing written material. Legislation must be explained. The trade associations extensively analyse legislation and we are informed about issues which directly concern us. But in general terms you have to sort things out yourself and of course that demands alot of time and energy.) **Company Director, Printing**.

Business support organisations were acutely aware of their responsibility to communicate the benefits of good environmental practices to the widest range of firms. However, the availability of high standard services does not guarantee high performance as was stated during conversation with a German SME Environmental Affairs Expert:

"Wie zugänglich sind diese Informationen - kann es sein, daß die Informationen den KMUs zur Verfügung stehen, aber sie sich der Tatsache nicht bewußt sind, daß die Informationen da sind und aus dem Grund nutzen sie die Informationen nicht?" (How accessible is this information - is it possible that the information is available to SMEs but that they are not aware the information is there and because of this do not use the information?)

"Ja, das ist in der Tat ein Problem, das erkennen wir, daß viele Unternehmer noch gar nicht wissen, das es sowas gibt. Deshalb sehe ich das hier als meine Aufgabe an, den Unternehmern das bewußt zu machen, indem wir zum Beispiel sowas veröffentlichen; zum Beispiel entwickeln wir ein betriebliches Umweltinformationssystem für KMUs ... auch CD-ROM, wo alles an Information zum Umweltschutz drin ist. Und dann kann das Unternehmen Umweltdaten abrufen, Umweltziele, Umweltpolitik, Umweltkosten, Umweltmarkt, umwelttechnische Neuerung, Umwelt und Verbände, usw ... Dann kann das Unternehmen sofort alle Behörden anklicken, die in Sachen Umweltschutz da sind mit Anschrift und Telefonnummer - aber wie Sie schon sagen, es ist den Unternehmen eben im Durchschnitt immer noch nicht so bewußt, wie wir uns das wünschen..." (Yes, this is in fact a problem, we recognise that many companies have no idea this sort of arrangement exists. That is why I consider it to be my job to make companies aware of our presence, by publishing these things; for example we are developing a corporate environmental information system for SMEs ... also CD-ROM, which contains all information on environmental

> protection. Then companies can call up environmental data, information on Environmental Targets, Environmental Policy, Environmental Costs, Environmental Market, Technical Environmental Developments, the Environment and Trade Associations, etc... Then firms can immediately access all environmental protection information available held by the Authorities at a click, with address and telephone details - but as you have said, companies on average are not as aware as we desire them to be...) **SME Environmental Affairs Expert**.

Improvements to the quality of environmental expertise offered by service providers and the accessibility of this service business support services were described as ongoing by all service providers. All business support organisations agreed that the nature of their performance and relevance to SMEs was to a large part dependent upon the level of finances conferred to such organisations to promote environmental protection. Notable differences in the patterns of support received or sought by UK and German SMEs were identified. More German responding firms received environmental support from the Chambers of Commerce (Table 8.21: *Industrie Handelskammer* (*IHK*)) - χ^2, r = 37.20, df = 1, p = 0.00000) whilst more UK responding firms received environmental support directly from Governmental institutions such as the Environmental Agency (Table 8.21: Government Institutions - χ^2, r = 14.52, df = 1, p = 0.0008) or Environmental Organisations such as the Groundwork Trust (χ^2, r = 25.16, df = 1, p = 0.00000). The use of Trades Associations and Government institutions were essentially identical amongst UK and German SMEs with an EMS (Table 8.21). Significant differences in the business support provided by the German Chambers of Commerce was evident and also the wide use of 'Other Organisations' for German SME environmental support, where in both instances the *Mittelstand* recorded 32.3% and UK SMEs 4.8% (χ^2, r = 5.67, df = 1, p = 0.01). The significant 'Other Support' received by the *Mittelstand* (Questionnaire Section 6.5: Other Organisational Support Received: UK - 4.8%, Germany - 32.3%) was explained as use of European environmental funding which has been particularly attractive to companies using or desiring to further employ the best available technologies and techniques applicable to corporate environmental management. The *IHK* and craft chambers (*Handwerkskammer*) are responsible for registering verified EMAS sites as defined by the State via the *Umweltauditgesetz* for the purposes set out in the

Umweltinformationsgesetz[162]. As discussed in Chapter Four and Six in relation to EMS development and the organisation of vocational training, the tasks performed by the *IHK* are indispensable features of industrial society framed by *Strukturpolitik*. Within the context of corporate environmental management the *IHK* is responsible for providing a comprehensive range of services which promote the use of new technologies, improve environmental management techniques, encourage energy efficiency as well as provide consultancy on integrated environmental protection strategies. Such services are also provided by UK Chambers of Commerce alongside other business support organisations such as the Environment Agency and Trade Associations. However, the multiple rationales of the *IHK* as a consequence of its traditional areas of expertise, links to Trade Associations, plus its knowledge of specific company requirements through their compulsory membership may confer the *IHK* with an efficacy and influence not shared by single business support systems in the UK to date. The high levels of environmental competence within the *IHK* is implied by the inclusion in its remit the responsibility to ensure that environmental verifiers and lead auditors satisfy trust, independence, technical qualifications and experience criteria to perform the various levels of EMAS auditing and site verification[163]. Membership of the German *IHK* is compulsory for firms engaged in business enterprise with very few exceptions[164]. All German companies financially contribute to the upkeep of the *IHK* and, therefore, have a vested interest in its effective functionality and relevance to business enterprise. Consequently the *IHK* exercises industrial, political and economic influence which cannot be equalled by the UK Chambers of Commerce with its voluntary firm membership code and comparatively limited financial support.

German companies in particular drew attention to the additional expenditure linked to structured environmental management, yet German companies which had

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[162]Refer to Appendix Table C.2 outlining the *Umweltauditgesetz*.

[163]*Umweltauditgesetz* §8 and §9.

[164]As defined by the German law "*Gesetz zur vorläufigen Regelung des Rechts der Industrie und Handelskammern* (1956, last revised in 1998), §1(1), §2(1-5) §3(5).

implemented an EMS voiced less concern about burdening financial costs than their UK counterparts (Tables 8.11 and 8.33). Research results emphasise the importance of financial and cost reduction factors in the corporate decision making process (Tables 8.1, 8.2, 8.3, 8.4 and 8.7). Compared with sources of external finance options available to UK SMEs, the sources of external finance for the *Mittelstand* or German SMEs have been substantial and the financial conditions attached to loans requested less punitive than experienced by SMEs in the UK. Therefore, 'cost cutting' or 'cost sensitivity' need not define corporate strategies of German SMEs as intimately as has been experienced amongst UK SMEs, especially during phases of firm economic vulnerability. Financial support for German corporate environmental management mirrors the wider financial provisions for general business enterprise considered in Chapter 6.3. State efforts to increase corporate commitment to environmental measures on a national and regional level are for the most part designed to address medium to long term (SME) enterprise requirements. In contrast the range of grants made available to UK firms on a national and regional level to improve corporate environmental management have on occasion been prematurely terminated. The grounds for termination have been related to poor company demand precipitated by the experiential or anticipated financial disadvantages attached to corporate engagements which are perceived to have cost implications and marginal immediate value. The significance of State financial contributions is strongly implied during the following discourse with a German SME Expert:

> *"... Aber viele werden mit Pilotvorhaben gefördert. Wenn die Förderungen auslaufen, gehts mit den KMUs in den Keller 'runter. Wenn diese Förderungen nicht mehr da sind, dann haben wir das Problem, daß die kaum noch größe Anreize haben, deshalb müssen wir uns überlegen, wie man die KMUs behandelt. Es gibt einige, die sagen „wir wollen eine EMAS-light haben" aber mittlerweile hat man sich in Deutschland davon überzeugt, daß man bei dem Öko-Audit keine Öko-Audit-light haben möchte. Man muß den KMUs auf andere Art und Weise helfen, zum Beispiel über Poolberatung..."* (... However, many firms were financially supported through pilot schemes. If the support measures run out then these SMEs have had it. If these financial measures are no longer available, then we will have the problem of there being no real incentive, so we have to consider how best to work with SMEs. There are companies which have said "we want to have a simplified EMAS" but in Germany we

> are largely against the idea of a simplified Eco-Audit. One has to help SMEs in another way, for example through 'mass consultancy' ['Resource Pooling'] ....) **SME Environmental Affairs Expert (*UBA*)**.

Whilst availability of particular forms of EMS financial support appears to have encouraged the uptake of EMAS amongst German SMEs and their non availability suggestive of a corresponding downturn in German EMS commitments, the relationship between financial support and environmental behaviour should be qualified by other factors. These include the impact of economic buoyancy on environmental action (Table 8.27) and the many examples of German SMEs within the cohort of EMS users which introduced certified and verified environmental management systems without State aid. Data analysis revealed statistically significant differences between the corporate goals of UK and German firms with environmental management systems (Table 8.3). It was evident that more UK SMEs followed a cost reduction strategy than German SMEs (χ^2, r = 5.10, df = 1, p = 0.02). More German SMEs aimed at securing competitive advantage through improved marketing measures than UK SMEs (χ^2, r = 4.77, df = 1, p = 0.02) whilst the roles reversed for diversifying market strategies (χ^2, r = 4.77, df = 1, p = 0.02). Other corporate orientations of note were the greater commitment on the part of German SMEs to product innovation strategies. The recorded environmental action and aspirations on the part of UK and German firms can also be described as reflecting the corporate goals and orientations of these firms. Despite the reluctance on the part of some UK SMEs to use corporate environmental management subsidies the experiences of participating SMEs have been positive:

> "... Also, just for your interest, we used the SCEEMAS Scheme to get established, and that was about 2 years ago and basically if you are a small company you can have 40% of the costs of establishing a system like this, paid on the line, and on completion you get 10%. The scheme finished before we actually completed but we had a 40% leg up .... because SCEEMAS had folded about a month before we had completed, but we got 40% of our costs reimbursed ... [Small companies have been reasonably well funded and supported -] there is another system that we haven't taken advantage of as yet called the "Conservation of Energy through Lighting"... These schemes are a bit bureaucratic as was SCEEMAS but you can still do it... The financial support comes and goes, I mean SCEEMAS came and went because it wasn't taken up that well...". **Environmental Manager, Packaging**.

9 CONCLUSIONS AND RECOMMENDATIONS

The study of the corporate environmental consciousness of SMEs in the UK and Germany involved devising a research model through which the relation between environmental values, knowledge, attitudes and action could be explored in the socio-economic context of these firms. SME characteristics and operational frameworks were examined alongside legislative principles and the means by which environmental activity may be pursued. In order to determine whether relationships exist between the research constructs representing the dimensions of corporate environmental consciousness, the research model was subjected to tests of statistical significance. The research questionnaire facilitated hypotheses testing, whilst interview questions confirmed quantitative findings and furnished additional insights into the effects of corporate environmental consciousness.

The Research Model has provided a means of accounting for different aspects of corporate environmental consciousness through quantitative and qualitative approaches. Initial telephone contact with all company respondents served to effectively access valid companies which were interested in contributing to the research objectives. Questionnaires were then completed by representatives who, in the view of the company, best articulated company responses to environmental issues. Consequently the company position of research respondents was determined by company bias. However, by virtue of the company selection process, research results house a bias in favour of firms sufficiently interested in corporate environmentalism. The Telephone Survey Questionnaire aimed at examining the reasons why Questionnaire non-respondents refused to participate but the scope of this exercise was not wide. Whilst the author encountered neither semantic nor inferential challenges in the translation of the English and German Questionnaires, nor were interpretation difficulties in the Questionnaires signalled by respondents, quantitative data processes remain subject to this possibility. The uniform understanding of the Questionnaire demonstrated by UK and German interviewees would suggest interpretation biases, if they existed, were limited or

uniform. A criticism that can be levelled at the Research Model Questionnaire is that the absence of educational background details of respondents in terms of 'science' or 'social science' categories prevented more extensive interrogation of the research data. Equally, the research process could also have featured intranational analyses in conjunction with international comparisons.

In Chapter 9.1 general conclusions drawn from the hypotheses investigating the research model are presented alongside research data examining corporate environmental management experiences in the United Kingdom and Germany. Reflecting upon these conclusions policy recommendations on a UK national executive and company level are presented in Chapter 9.2. Research methodological issues are raised and areas for future research are identified in Chapter 9.3.

9.1 General Conclusions of the Research

1. Correlations between corporate goals and country were identified. Whilst researched firms in the UK and Germany broadly shared similar views in terms of corporate goal priorities, statistically significant levels of UK SMEs pursued market diversification strategies and focused on company culture or communication improvements; more German SMEs gravitated towards marketing of the company and promoting product innovation.

2. Corporate value orientations played a central role in the expression of environmental attitude, commitment and action in UK and German SMEs. Companies espousing positive environmental values were demonstrated as being more likely to express positive attitudes towards the environment and the impacts of environmental management than firms where such values were absent. A greater applied appreciation of the impacts of environmental principles on potential competitive enterprise was also displayed by UK and German firms in which environmental knowledge possessed by an individual or a group could be

described as (co-)driving key company activities. UK firms committed to enhancing the physical environment associated such enterprise with additional work alongside an improved company image. Large numbers of German firms were motivated to develop environmental management systems because of their capacity to improve company image. Equally, however, German firms which were committed to enhancing the physical environment also associated the EMS with systemic problems and additional resource overheads. Corporate environmental attitude and value correlations were also in evidence, but more closely associated with German SMEs.

3. Correlations were identified between corporate orientations and environmental attitudes. Whilst there were broad similarities in UK and German firm corporate orientations, distinct attitudinal patterns formed where corporate orientations of firms were examined against responses to statements regarding environmental practice and its implementation. More German firms which claimed to have introduced environmental investments to specifically minimize liability risks felt German legislation and environmental prohibitions had reached the limit of their effectiveness. German firms introducing environmental investments on the basis of image and marketing considerations claimed qualified staff were especially attracted to their firms and also disagreed with the view that German environmental legislation standards were too high and limited competitive competencies. Companies often held conflicting views of the effects of EMS implementation. Statistically significant numbers of UK and German firms which undertook environmental investments in order to reduce company costs believed EMS implementation would result in cost savings as well as conflicts with existing business systems. German companies which had undertaken environmental investments in order to reduce company costs also felt they would not be offered adequate external support and anticipated problems organising personnel. UK and German companies promoting environmental investments to engender competitive advantage also claimed EMS implementation would inconvenience the pursuit of

other business activities, but many firms within this cohort believed EMS implementation would support company efforts to maintain the company market position.

4. Corporate orientations significantly correlated with environmental action. For example, image and marketing considerations, as corporate orientations, strongly associated with the practice of the majority of EMS elements. Significant numbers of German firms which promoted environmental investments as a means to minimise legal liability risks conducted Environmental Reviews and exercised Good Management Practices. Significant numbers of German SMEs which undertook environmental investments with the aim of winning new customers had also produced an Environmental Statement and conducted Site Audit activities. UK firms aiming at upholding local authority standards through environmental investments had either introduced an EMS structure, an Environmental Policy or a certified EMS. There was a direct relation between environmental values and environmental action, whereby companies with a certified or verified EMS essentially upheld positive environmental values. However, no meaningful relation between positive environmental attitudes expressed by UK firms and environmental action was established; in the case of German firms the scope of environmental attitude-action relations was limited.

5. Environmental action significantly correlated with perceived economic buoyancy of companies. EMS implementation was not a consideration of UK or German SMEs with negative turnover expectations. EMS implementation was a consideration of UK firms with either positive or median turnover expectations but was exclusively associated with German companies with positive turnover expectations.

6. Distinct patterns in the use of business support organisations could be observed amongst UK and German SMEs. In general terms more UK firms sought

environmental assistance from Government organisations such as the Environment Agency (Envirowise) and Green Business Clubs than their German counterparts whilst comparatively large numbers of German firms sought assistance from their Chambers of Commerce. Whilst similar numbers of UK and German SMEs with an EMS acquired support from Government institutions, significantly more UK firms in this cohort sought assistance from Green Business Clubs and a negligible percentage of UK firms received support from the Chambers of Commerce; support received from the *IHK* by German firms with an EMS was comparatively high.

7. Examination of the environmental consciousness constructs in relation to industry sector exhibited very few statistically significant results. However, in quantitative terms, firms representing the Chemicals, Rubber and Plastic sector and Food and Beverages sector were highly supportive of corporate values promoting the enhancement of the physical environment. In addition to expressing high levels of environmental concern and commitment, SMEs in these two sectors recorded the highest levels of certified and verified EMS ownership.

8. Correlations existed between company size and environmental knowledge, commitment and action. Increases in the level of corporate environmental commitment generally corresponded with increases in company size. Correlations were traced between firm size and knowledge, whereby more environmental knowledge was associated with larger UK and German firms. Equally, distinct correlations were noted between company size and environmental action. Larger firms were more likely to use environmental management system elements, possess an EMS and own a certified or verified EMS than smaller firms. General concern for the physical environment was expressed by all company size groupings; medium-sized UK and German enterprises recorded higher levels of commitment to positive corporate environmental values than small or micro enterprises.

9. The low EMAS or ISO 14001 uptake levels by SMEs may suggest that market based tools such as EMAS and ISO 14001 are not effective. However, the degree of EMS impact defined in quantitative terms at a particular point in time is not necessarily the most effective way to assess the impact of EMS *use*, which influences corporate understandings and practice, whilst the EMS *structure* and *evolution* is informed by socio-economic factors.

10. Companies using a Quality Management System were more likely to use certified or verified environmental management systems than companies without a QMS. All UK users of the certified ISO 14001 system possessed a QMS whilst QMS use was more closely associated with German medium-sized enterprises. Comparatively large numbers of UK SMEs with an EMS also had a Health and Safety management system. However, experience with the use and implementation of a QMS did not reduce the likelihood of systemic or staff disruptions associated with EMS implementation.

11. The level of theoretical knowledge of UK SMEs in relation to corporate environmental management and defined by the elements of EMAS and ISO 14001 was comparatively high. The applied knowledge of UK firms in principle was also comparatively high but the level of applied knowledge as an expression of *compliance* to certified or verified environmental management systems is lower than that of German SMEs. High levels of environmental knowledge and environmental sensitivity are not in themselves demonstrative of high environmental consciousness. Cognitive and affective factors must be contextualised by conative factors in order to avoid misleading understandings of environmental orientations.

12. Although UK firms demonstrated high levels of corporate environmental management knowledge as defined by EMAS and ISO 14001 elements, an underlying training deficit in technical areas and environmental legislation was

implied by the significantly higher levels of requested support in those areas by UK SMEs when implementing an EMS. In contrast the concern of German firms during EMS implementation centred around staff selection and organisation.

13. EMS requisitions intimating structural, procedural and psychological changes encounter passive and active forms of resistance. The degree of internal conflict experienced during EMS implementation was significantly linked to the degree of relevant, adequate training and motivation received by system actors in addition to the openness of corporate communication. The closer association of UK SMEs with EMS implementation conflict was not identified with deficient practice of EMS elements but directly linked to the absence of a (re)conciliatory framework with functional capacities of the *Betriebsrat* in the UK context. The role performed by the *Umweltbeauftragter* was also identified as an important influence on conflict reduction during EMS implementation and maintenance.

14. Institutionalisation factors both directly and indirectly influenced corporate environmental behaviour in UK and German SMEs defined by industry sector. The mode and extent of company commitment to the defined EMAS and ISO 14001 elements is primarily influenced by institutionalisation factors. The performance thresholds of UK and German legislation in relation to corporate environmental information declarations waste management and *Resourcenvorsorge* principles directly influenced company commitments to Environmental Statements.

15. Overall the most influential member of staff driving corporate environmental management in UK SMEs was identified collectively as 'the Company Management'. The most influential member of staff driving corporate environmental management in German SMEs is identified as 'the Company Director'. The main sharers in ISO 14001 or EMAS implementation and development were the Company Director, the environmental manager or officer and quality manager. The German sharers of ISO 14001 and EMAS

implementation and development activities were the Company Director and environmental manager. The intimate involvement of the Company Director in the affairs of general corporate environmental management, the activities performed by the *Umweltbeauftragter* and the pivotal role played by the Company Director in the implementation of environmental management systems was suggestive of a higher priority given to environmental protection in German SMEs and, or the consequence of, the additional environmental liability factors with which German firms currently contend.

16. The importance ascribed to the majority of environmental measures increased with the implementation of certified and verified environmental management systems, amongst UK and German SMEs. The more extensive use of the Environmental Statement by German SMEs suggested a greater applied appreciation of corporate ecologies in those firms. German SME respondents recorded higher levels of environmental action as defined by the uptake of certified and verified EMS elements and systems. However, this research also indicated that the Environmental Statement, albeit indicative of extensive environmental action, might not express substantive environmental commitment on the part of the German SME beyond base legislative requirements.

17. The environmental costs associated with EMS implementation were a source of greater concern for UK SMEs than for German SMEs. A contributory influence to the comparatively lower concern levels of German SMEs in relation to EMS costs was the wider and favourable national sources of external financial support available to German SMEs.

9.2 Policy Recommendations

As previously indicated, the Research Model revealed that high coincidences of environmental value-attitude and value-attitude-action relations were demonstrated where institutionalisation factors positively and actively shaped the nature of environmental discourse and engagement within the firm. Increased environmental activity in the UK and Germany owes much to the prompting of European Union environmental policy. Environmental principles at the heart of EU legislation have provided scope for national contextualisation of environmental regulatory practice. An examination of UK and German environmental law provides significant insights into socially instituted environmental consciousness, revealing a legal diversity not always apparent in the face of the operational uniformity of EU environmental strategies. The comparatively higher environmental commitments of German SMEs cannot be divorced from the application of *Vorsorge* principles in environmental legislation. German policies have been identified as encouraging German enterprises to exploit market opportunities in the fields of applied environmental technology and environmental research regardless of company size. All firms remain conscious of their environmental responsibilities as a consequence of heightened environmental liability legislation. Legally defined provisions for corporate environmental protection joint venture projects have promoted the collective commercial strengths of its parties, who are able to benefit from the additional environmental insights and abilities ensuing from such associations. The national benefits of this strategy are twofold. Firstly, the German economy prospers from environmental research advances secured through German firms as the first market entrants and subsequent market leaders. Secondly, improvements made to the physical environment enrich social wellbeing. *Vorsorge*-oriented interpretations of EU environmental principles by UK statutory powers would enhance corporate environmental values and, by extension, environmental action of UK corporate actors. State measures promoting joint ventures amongst UK firms would also encourage increased numbers of SMEs to investigate the commercial benefits of environmental management projects and research.

Importantly such a policy would contribute to proactive approaches in the pursuit of environmental best practices amongst UK firms as a whole.

The applied principles of German *Strukturpolitik* have supported the environmental interests of smaller firms in both general and specific ways. The recognition that small firms are not simply small and medium-sized enterprises but form part of a *Mittelstand* which acquires financial and strategic support within regional *Länder* determined that German small firm enterprise has been exercised in a business climate where entrepreneurs are more predisposed to the receipt of State driven financial support and strategic direction on a regional level. In recent history UK industrial policy has been characterised by deregulatory eco-political impulses with less State financial intervention at a regional level. Consequently UK SME success has been more attributable to corporate autonomy and less influenced by the development of extensive State-driven financial and regional provisions, which neither existed nor were anticipated. Research conclusions suggest that the challenge facing future State-driven programmes promoting corporate environmental investments in the UK is threefold. Firstly, attitudes towards the relevance of State interventions on behalf of industry and actual State intervention on behalf of industry must sufficiently change to guarantee a wider embrace of State pronouncements on the part of UK firms. Secondly, State-driven environmental programmes requiring corporate investment must be perceived by UK firms, including SMEs, as relevant, reachable and realistic in the context of their business enterprise. The author contends that failure of SCEEMAS was, and limited response to the DTI Acorn Project is rooted in the misaligned base corporate values and new, higher institutional values embodied in the proposed scheme. In order to increase the likelihood of corporate commitment toward schemes such as EMAS, embedded corporate values need to, in the first instance, more closely reflect proposed institutional aspirations, thereby reducing the potential risks and costs associated with voluntary environmental engagement. Thirdly, a wider and more competitive range of external financial support provisions

must be offered to UK SMEs to encourage additional corporate programme investments.

One of the most important business support agencies for the *Mittelstand* is the German Chambers of Commerce. The importance of the *IHK* to German firms in general lies in the fact that *IHK* membership is compulsory and all firms have a vested interest in its relevance and success. The environmental importance of the *IHK* to German firms is borne out of its responsibility to oversee EMAS site verifiers, lead auditors and environmental expertise under the auspices of the State. The voluntary membership code of and limited financial support received by the UK Chambers of Commerce weakens its collective company relevance, whilst the absence of a defined environmental role further limits its scope as a centre of SME excellence. SME environmental challenges may well fall under the remit of the Small Business Service (SBS), the aim of which is to address specific concerns and needs of all UK firms with less than 250 employees. It is hoped that achieving these objectives will result in improved knowledge and environmental expertise available to SMEs and not the dislocation or loss of information from within the corpus of business support organisations it wishes to reconstruct. The SME Executive, irrespective of its political heritage, must be afforded sufficient loyalty and financial investment by UK Governments in order to consolidate its corporate relevance.

An important difference between the attitude of validated and non-validated firms towards EMS implementation is that validated firms perceive an economic benefit from the EMS, whilst non-validated firms attach little or no economic benefit to EMS implementation. EMS implementation will increase if the environmental media, including the Environment Agency, DTI and Green Business Clubs, more cogently emphasise the economic and social value of environmental management systems in both familiar industrial contexts and those which are not purely 'environmental'.

The extension of EMAS to all industry sectors furnishes the environmental media with additional opportunities to spread an understanding of wider EMS applicability.

Environmental commitment and orientations were identified as significantly correlating with corporate goals and orientations. This understanding is important where attempts are made to encourage certified or verified EMS engagement and to define factors which stimulate measured corporate environmental action. For example, where product price or cost cutting rationales are the prime or singular selling criterion, profit margins tend to be low. Such companies are more likely to be dissuaded by the environmental benefits of projects such as EMS development, which may imply reductions to profit margins. These companies are more likely to be attracted by media information highlighting the immediacy of EMS benefits in the form of reduced legislative liability and energy costs, which may offset direct short to medium term profit losses. Profit margins are theoretically higher where companies pursue differentiation strategies. In addition to the above-mentioned benefits, the marketable aspects of EMS ownership constitute a greater attraction to such firms despite the additional costs EMS development may imply in the short and medium-term. Organisations encouraging EMS use can better tailor their promotions on the basis of industry sector and company character differences.

Where corporate environmentalism is no more than an adjunct to other corporate activities it follows that a developed EMS may not be fully geared to the corporate objectives of business. The result is an EMS which satisfies certification or verification criteria but is not designed to meet company needs. Environmental decisions or practices not extensively integrated into the corporate decision process can at best be strategically neutral influences and at worst gravitate towards issues in conflict with defined company objectives, which may in turn provoke inter-personnel conflicts. EMS standards and regulations can overcome problems of divergent understandings of EMS progress by specifying continuous improvement

criteria defining administrative and ecological system aspects. These aspects should then be included in Environmental Policies and Environmental Statements.

The majority of UK and German firms in this research agreed that ignoring environmental responsibilities is likely to weaken bargaining power in the marketplace. However, without the benchmarking function that the certified and verified EMS can provide, companies are less able or likely to introduce measures to continuously assess the level and dimensions of environmentally-oriented competition within its markets. Equally, companies can easily lose the impetus an EMS provides to improve business performance through learning from other companies or identifying best practices. Therefore, a certified or verified EMS should not be considered as a ready-made panacea for existing company failings but instead be viewed as a structure through which identified company problems are resolved and ongoing targets attained. As was illustrated in the company studies, existence of system targets can contribute to shared aspirations whilst the collective responsibility for achieving shared targets reinforces the necessary executive influence to guarantee sustained improvements. Furthermore, systematic and rigorous approaches to company learning and the application of company learning through an EMS provides the basis upon which highly objective, company-specific solutions or targets can be introduced and used to outmanoeuvre competitors in key areas of company performance.

One criticism levelled at certified and verified environmental management systems is that they encourage bureaucracy borne out of procedural correctness. However, the operational latitude conferred to environmental management system implementers would suggest system outcomes are self-defined. Claims of bureaucratisation or system inflexibility may well point towards environmental performance difficulties which, although are the consequence of particular EMS practice, do not necessarily highlight operational flaws in the systems of environmental management themselves. It should be emphasised that top

management need to exert themselves in the task of ensuring that environmental input in corporate strategic debates is comprehensive and defined corporate decisions mirror the complexity of these environmental inputs. The implication for environmental executives is that they must be allowed to think and act in a more strategic manner. Such strategic thinking will involve directing their engagements beyond simply doing things efficiently towards effective performance. In some companies environmental management is essentially driven by environmental specialists and not by senior executives, for the reason that the specialists are the custodians of environmental understanding and are, therefore, better able to formulate environmental decisions. Under such circumstances the danger exists that important company environmental perspectives are neither fully addressed at top executive level nor, conversely, are the environmental implications or opportunities of corporate aims fully explored at all stages of the decision making process. The conventional role of the environmental manager has required the exercise of skill and experience in effectively dealing with the demands of environmental legislation, employee safety, risk analysis and associated operational procedures. Consequently the environmental manager neither applies environmental knowledge to the formulation of key conventional corporate decisions nor does such knowledge necessarily inform key corporate debates. However, only in cases where an individual is both responsible for environmental management and higher corporate management functions has the application of environmental strategies opportunity to be both automatically vocalised and applied across the widest range of corporate policy perspectives. Companies need to challenge corporate conventions which determine that divisional operations of environmental specialists and top executives result in strategy discussions which are not sufficiently qualified by environmental analyses of corporate decision making. In order to introduce a competitive environmental focus, the expertise of the environmental manager must be accommodated higher up the corporate chain; the strategic engagements of the Company Director must also more specifically accommodate the insights of the company environmental specialist. Greater use of

(re)conciliatory fora such as the German works council in the management of environmental protection should be encouraged amongst UK firms. Without a basis for shared understandings internal support systems, controls, information provision and other functions are less coordinated or less developed to compliment relevant environmental and other corporate requirements. In the absence of mechanisms to integrate disparate corporate experience and knowledge, environmental objectives are more likely to be assessed on fragmented or conflicting understandings of knowledge holders or managers in accordance with what seems to be relevant at the time.

Research results indicate that companies which successfully implemented environmental management systems subsequently benefited, or anticipated benefiting, from improved market and technological intelligence. This results from an enhanced ability to chart trends relating to environmental and technological changes. This insight strengthens a company's position against other competitive enterprises in related areas. The greater coherence and information transfer within organisations encouraged by environmental management systems provides the basis upon which companies are able to more effectively exploit technological advancements, access funding which promotes integrated environmental excellence, and benefit from collaborative initiatives. Heightened environmental knowledge and experience also enables companies to transfer their experience, an act which increases a company's awareness of events and its ability to exploit ensuing synergies. Continuous improvement processes within an EMS can also assist a company to differentiate its products in key areas from ecological product development through to the availability and use of alternative new materials as a way of more effectively satisfying a product's technical, legislative and aesthetic requirements. However, if the strategic rationale for EMS implementation has not been thoroughly investigated or introduced, systemic conflicts within the EMS and competing influences within other departmental or project interests have increased the opportunities to sabotage EMS operations. Frustrations may surface where so-

called tangible benefits are exposed as illusory. Where the EMS is subject to conflict, achieving identified environmental targets, regardless of the nature of potential benefits, will involve counterproductive struggles. The implication of these conclusions is that in the worst instances EMS implementation can actually result in significant disadvantages for companies.

Larger firms tend to have dedicated environmental personnel to address environmental affairs and systematically manage environmental enterprise. Whilst the scale of environmental and related legislative impacts of SMEs may be smaller when compared with larger enterprises, knowledge deficits in SMEs determine that they are dependent upon external assistance when initially introducing an EMS. Increased economies of scale gained from joint training sessions with other SMEs would reduce the financial costs associated with external consultancy and expose personnel to alternative approaches to environmental management. The advantages derived from applying the principle of economies of scale are most evident where markets are characterised by high volumes and product similarity. However, large company size presents particular challenges not typically encountered by smaller enterprises. These include extensive layers of management and comparatively high levels of bureaucracy which encourage formal relationships between top executives, management teams and workers. The introspective nature of such activities can easily lead to the departmentalisation of company operations, the loss of uniformly focused company vision, as well as retard the processes aimed at effectuating timely and selective corporate change. In critical respects top executives in comparatively smaller firms are able to more singularly manage the relationship between environmental management systems, product manufacture, product processes and product marketing than is possible in larger enterprises. Fewer levels of management in smaller enterprises are also suggestive of a greater scope for close cooperation and understanding between top management and environmental actors. Smaller enterprises can enjoy the benefits derived from the potential for simpler forms of control and managerial style,

informal communication, higher levels of employee participation and high levels of employee motivation. In many micro and small enterprises which function as outsourced business units of larger enterprises, corporate responses are invariably reactions to the demands of their customer base and are, therefore, reactive. Medium and larger enterprises as important customers may be able to disseminate good environmental management practices and influence the practices of dependent enterprises. Equally, whilst smaller enterprises which supply customised products can experience product specification constraints, these limitations need not impair other aspects of corporate environmentalism such as waste minimisation, manufacturing processes and energy conservation.

The majority of UK and German firms with the ISO 14001 standard also used ISO 9001. These systems are described as intersecting each other and offering opportunity for reduced system documentation since the structural similarities between ISO 14000 and 9000 series encourage the fusion of environmental and quality factors. However, problems may surface between environmental and quality managers since the operational rationales of environmental protection and quality assurance tend to be distinct in practice. Amongst UK SMEs there was a high level of Health and Safety System use for the management of health and safety, which offers considerable conceptual synergy potential with environmental management. Stronger links between H+S and EM systems should be encouraged in the UK, especially where a Health and Safety Management System culture appears to be established amongst SMEs. Greater collaboration should exist between the HSE and EA to improve the management of their mutually inclusive interests.

Research results emphasise that participation in certified or verified environmental management systems significantly contributes to the improvement in employee motivation and familiarity with environmental issues at work. Firms with an EMS were more likely to have a higher level or introduce measures to improve the level of environmental training and environmental qualifications of staff. It would be fair

to say that increased corporate commitment to environmental management training and qualifications amongst firms with an EMS are not necessarily indicative of a diffusion of environmental training which includes training and education provisions for non-specialist environmental staff. Also, limited employee influence in the strategic formulation of environmental management is a function of management style and not a weakness in ISO 14001 or EMAS methodology. Again, the environmental media should readily stress the competitive benefits implied by an EMS to a wide industrial audience, such as the opportunity to restructure corporate relations to more effectively utilise human capital.

9.3 Research Recommendations

On the basis of this research investigation the following areas and themes have been identified for future research:

1. Comparative study of the costs associated with implementing environmental management systems in the UK and Germany.

2. Examination of the impact of works council models in the context of environmental conflict mediation and promoters of integrated environmental management.

3. Examination of the impact of revised EMAS as a medium of increased environmental consciousness of workers.

4. Investigation of the causes of pre- and post-EMS implementation staff conflicts.

5. Application of the Research Model to study the effectiveness of the Environmental Policy as a medium of corporate environmental consciousness.

6. Application of the Research Model to study the Environmental Statement as a medium of corporate environmental consciousness.

7. Application of the Research Model to study the Environmental Auditing Process as a medium of corporate environmental consciousness.

8. Comparative study of the corporate environmental capacities of business support organisations in the UK and Germany.

9. Examination of the nature of environmental engagement in manufacturing SMEs without an EMS in the UK and Germany.

10. Examination of UK and German SMEs with strong ecological orientations.

11. Investigation of the relation between corporate environmental management and Health and Safety practice in SMEs and their potential synergies.

12. Examination of the effects of good environmental practices and the impact of disseminating agents of such practices on corporate environmental change.

13. Discourse analysis of the significance organisational members assign to constructs of environmental consciousness.

14. Examination of the legislative signals relating to the rewards and penalties of corporate environmental management amongst SMEs in the UK and Germany.

15. Examination of the functionality and expertise of the *IHK* as a medium of integrated environmental support.

16. Comparative examination of UK and German environmental media as promoters of environmental consciousness.

17. Examination of the corporate environmental consciousness of SMEs in different industry sectors.

18. Intraregional and interregional investigation of the corporate environmental consciousness of SMEs.

19. Application of the Research Model to study the corporate environmental consciousness of SMEs in different nation states.

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Appendix A.1: English Questionnaire

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Introduction to Questionnaire

This questionnaire will take on average thirty (30) minutes of your time to complete.

Please make an entry in one box per statement or question, unless more than one box entry is requested.

No particular level of environmental expertise or knowledge is required or expected of company representatives when completing this questionnaire. For this reason we recommend that an attempt is made to answer each question.

If you would like to receive the questionnaire results on the environmental practices within Small and Medium-sized Enterprises in the UK and Germany, please tick the 'yes' box in Section 7 and enclose addressee details.

Please return within 10 days of receipt.

We would like to thank you in advance for your time.

Questionnaire for Environmental Management in Small and Medium-sized Enterprises

1. Personal and Company Details

1.1 Position in Organisation

- Company Director ☐
- Company Environmental Manager ☐
- Company Environmental Affairs Representative ☐
- Departmental Manager ☐
- Other: _____ ☐

1.2 Education

- CSE/GCE/GCSE ☐
- 'A' Level ☐
- University Degree ☐
- Other: _____ ☐

1.3 Number of Company Employees

- 1 - 9 ☐
- 10 - 49 ☐
- 50 - 99 ☐
- 100 - 249 ☐
- 250 - 500 ☐

1.4 Industry sector

- Chemical/ Rubber/ Plastics ☐
- Machinery Construction/Industry Equipment ☐
- Publishing/Printing/Paper ☐
- Food and Beverages ☐

2. Corporate Management

2.1 How satisfied were you with your company performance during the last business year?

very satisfied	satisfied	neither nor	dissatisfied	very dissatisfied
1	2	3	4	5
☐	☐	☐	☐	☐

2.2 What are your company turnover expectations for the next three years?

very positive	positive	neither nor	negative	very negative
1	2	3	4	5
☐	☐	☐	☐	☐

2.3 How would you evaluate the following corporate goals in your company? Please select the three (3) most important goals of your company in the next three years by ticking the corresponding boxes.

Diversification of market	☐
Promotion Marketing/Sales	☐
Investment in Production Technology	☐
Improvement of Company Culture/Communication	☐
Reducing Costs	☐
Improvement of Motivation and Qualification of Staff	☐
Upgrading IT	☐
Further improvement of Quality Assurance	☐
Intensifying Research and Development Activities	☐
Improving Company Competitiveness	☐
Strengthening Environmental activities	☐
Promoting Product Innovation	☐

Appendix A.1: English Questionnaire (ctd.)

2.4 Increasing numbers of companies are indicating a willingness to more effectively control the impacts that their activities have on the physical environment. When considering the forms of environmental investment you may have made to date in your firm, which of the following targets do you consider to be of most importance? (Tick more than one box if required)

Reduction of Costs ☐

Minimizing liability risks ☐

Image and Marketing considerations ☐

Total "greening" of the company ☐

Gaining competitive advantage ☐

Winning new customers ☐

Other (eg upholding standards required by the Authorities):

_____ ☐

None made to date ☐

3 Environmental Concerns

3.1 To what extent do you agree with the following statements in relation to the physical environment?

	totally agree	inclined to agree	neither agree nor disagree	inclined to disagree	totally disagree
	1	2	3	4	5
A. "Worries about secure employment are more pressing than thoughts concerning the future of the environment."	☐	☐	☐	☐	☐
B. "Preoccupation with environmental protection increases cost pressures within firms, which unavoidably result in job losses."	☐	☐	☐	☐	☐
C. "Technological invention will solve pollution problems."	☐	☐	☐	☐	☐
D. "Ecologically-insensitive management practice within firms will endanger the survival prospects of such firms in the foreseeable future."	☐	☐	☐	☐	☐
E. "The increasing cost of environmental protection negatively impacts our standard of living and by extension the health of the national economy."	☐	☐	☐	☐	☐
F. "The "media" exagerrates the scale of environmental problems we face."	☐	☐	☐	☐	☐
G. "We live in a society in which the negative side of progress increasingly determines the nature of debates concerning the environment."	☐	☐	☐	☐	☐
H. "All employees should be taught about environmental protection as part of their occupational training."	☐	☐	☐	☐	☐
I. "Continuous exploitation of nature causes irretrievable damage to the natural resources, upon which all societies are dependent."	☐	☐	☐	☐	☐
J. "The effects of modern technology are predominantly positive."	☐	☐	☐	☐	☐

Appendix A.1: English Questionnaire (ctd.)

3.2 The nature of environmental activities conducted within firms is shaped by different factors. To what extent do you agree with the following statements regarding environmental practice and its implementation in your firm?

	totally agree	inclined to agree	neither agree nor disagree	inclined to disagree	totally disagree
	1	2	3	4	5
A. "Safeguarding jobs and economic success is of paramount importance in our company."	☐	☐	☐	☐	☐
B. "Thorough corporate environmental management is necessary in the face of increased legal liability risks."	☐	☐	☐	☐	☐
C. "Long-term economic success in our company is not imaginable without considering ecological demands."	☐	☐	☐	☐	☐
D. "Qualified staff are attracted to us because of our ecologically responsible production methods."	☐	☐	☐	☐	☐
E. "The UK environmental standards specific to our industry are too high, and if this trend continues we will lose our ability to compete."	☐	☐	☐	☐	☐
F. "In the face of legislative pressure we have no choice but to extend corporate environmental practice within our firm."	☐	☐	☐	☐	☐

Appendix A.1: English Questionnaire (ctd.)

3.3 To what extent do you agree with the following statements regarding political/governmental influence on environmental behaviour within your industry?

		totally agree	inclined to agree	neither agree nor disagree	inclined to disagree	totally disagree
		1	2	3	4	5
A.	"Policy instruments in the form of statutory laws and prohibitions have considerably influenced environmental behaviour within your industry."	☐	☐	☐	☐	☐
B.	"Environmental problems are primarily caused by industry but it is the Government via policy which is left to search for the solution to these problems."	☐	☐	☐	☐	☐
C.	"Legislative pressure has prompted the use of stricter environmental controls within companies."	☐	☐	☐	☐	☐
D.	"The 'Precautionary Principle' has considerably influenced environmental behaviour within your industry."	☐	☐	☐	☐	☐
E.	"The 'Polluter Pays Principle' has considerably influenced environmental behaviour within your industry."	☐	☐	☐	☐	☐
F.	"Cooperative and voluntary practices between companies have considerably influenced environmental behaviour within your industry."	☐	☐	☐	☐	☐
G.	"Economic instruments in the form of environmental permits and taxation have considerably influenced environmental behaviour within your industry."	☐	☐	☐	☐	☐
H.	"Statutory laws and prohibitions on the environment have reached the limit of their effectiveness."	☐	☐	☐	☐	☐

4. Company Culture and the Environment

4.1 To what extent do you agree with the following statements regarding the organisational culture in your company?

		totally agree	inclined to agree	neither agree nor disagree	inclined to disagree	totally disagree
		1	2	3	4	5
A.	"We are often praised for our customer service."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B.	"We are always acquainted with the relevant and most recent environmental legislation in our industry sector."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C.	"Our firm does much to enhance the physical environment."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D.	"Protecting the environment is more important than business profit in our firm."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
E.	"Almost all employees are interested in possible ways to improve our firm."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F.	"In our firm learning about environmental protection is a compulsory part of employee training."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
G.	"We have accepted many suggestions as to how to improve the environmental practice of our firm."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
H.	"All employees have easy access to comprehensive and practical information about environmental practices in our firm."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I.	"The person responsible for environmental affairs in our company has a lot of influence."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
J.	"All employees are kept well informed about important future developments in our firm."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Appendix A.1: English Questionnaire (ctd.)

		totally agree	inclined to agree	neither agree nor disagree	inclined to disagree	totally disagree
		1	2	3	4	5
K.	"In this firm environmental protection guidelines are both clear and understandable."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
L.	"All employees must regularly attend training courses in their area of work."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
M.	"We are often praised because of our efforts to enhance the physical environment."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
N.	"Our company engages in discussions about improving environmental practice with other firms."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
O.	"In our firm we regularly conduct training sessions in preparation for environmentally dangerous situations."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
P.	"We actively encourage companies to adopt an environmental strategy similar to our own."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

4.2 Are environmental guidelines specified in writing within <u>your</u> firm?

Yes ☐

No ☐

Appendix A.1: English Questionnaire (ctd.)

4.3 Which environmental measures are <u>currently</u> of importance for your firm? Please assess these measures in relation to their importance to your firm.

	very important 1	important 2	neither important nor unimportant 3	unimportant 4	completely irrelevant 5
Energy saving and improving Energy Efficiency	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Environmentally oriented transport of raw materials	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Reuse of waste materials	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Avoidance/Minimisation of Waste	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Water and Effluent reduction	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Dealing with water-damaging substances	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Control and reduction of emissions	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Changing existing production processes	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Introducing new production processes	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Creating environmentally suitable products	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Ecological product development	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Appendix A.1: English Questionnaire (ctd.)

	very important 1	important 2	neither important nor unimportant 3	unimportant 4	completely irrelevant 5
Improving the environmental practices of contractors and suppliers	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Preventing and restricting environmentally-damaging accidents/disturbances (providing danger safeguarding mechanisms)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Providing personnel with information and training regarding ecological issues	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Improving technical equipment	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Environmentally sensitive purchasing	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Reinforcing control of environmentally relevant activities	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

4.4 When thinking about implementing Environmental Management in your firm, which problems do/did you envisage? (Tick more than one box if required)

Problems associated with organising personnel	☐
Conflicts with other Management Systems	☐
Extra work for staff	☐
Resistance on the part of management	☐
Inconvenience in the face of additional responsibilities	☐
Increase in company costs	☐
Resistance on the part of company director(s)	☐

Appendix A.1: English Questionnaire (ctd.)

Environmental information and training needs ☐

Opposition on the part of the workers ☐

An overburdening requirement to produce information ☐

Too limited support from outside the company (eg, from Business Associations, Guilds, etc) ☐

Other problem(s): _____ ☐

No problems envisaged ☐

4.5 What advantages do you anticipate will follow from introducing Environmental Management in your firm? (Tick more than one box if required)

An improved company image ☐

Risk reduction in terms of environmental liability legislation ☐

Improved competitive prowess ☐

Resource saving ☐

More environmentally-friendly products ☐

Increased staff motivation ☐

Greater consideration of changing customer demands ☐

Maintenance of company market position ☐

Cost savings ☐

Other: _____ ☐

No advantages ☐

4.6 Who is most influential in promoting or driving environmental protection improvements in your firm? (Tick more than one box if required)

Members of staff ☐

Company Management ☐

Environmental Manager/Officer ☐

Appendix A.1: English Questionnaire (ctd.)

Works Council/Factory Council or Committee	☐
Company Directors	☐
Suppliers	☐
Customers	☐
(Local) Authorities	☐
Environmental Legislation	☐
Other: _____	☐
No one	☐

5. Environmental Management

5.1 Does your company use an Environmental Management System (EMS)?

Yes, already in use ☐

An EMS will be in place within the next three years ☐

No ☐

5.2 Is your firm under legal obligation to organise and make individuals directly responsible for carrying out environmental practices within your firm?

Yes ☐

No ☐

Don't know ☐

5.3 Are you familiar with the European Union Eco-management and Audit Scheme (EMAS) Regulation?

Yes ☐

Partial knowledge ☐

No ☐

5.4 Have you secured or are you planning to secure EMAS certification within the next three (3) years?

Yes ☐

No ☐

Don't know ☐

5.5 Are you familiar with the process of Environmental Management as outlined by the certifiable standard EN ISO 14001 (BS7750)?

Yes ☐

Partial knowledge ☐

No ☐

Appendix A.1: English Questionnaire (ctd.)

5.6 Have you secured ISO 14000/BS 7750 or are you planning to secure the EN ISO 14001 standard within the next three (3) years?

- Yes ☐
- No ☐
- Don't know ☐

5.7 Are you familiar with the following individual elements of the EMAS Regulation? (Tick more than one box if required)

- Good Management Practices ☐
- Environmental Site Audit ☐
- Environmental Management System ☐
- Environmental Review ☐
- Formulation of an Environmental Policy ☐
- Environmental Statement ☐
- Certification/Validation ☐
- None of the elements above ☐

5.8 Which of the above listed EMAS measures have already been introduced in your firm? (Tick more than one box if required or N/A if you are not introducing EMAS)

- Good Management Practices ☐
- Environmental Site Audit ☐
- Environmental Management System ☐
- Environmental Review ☐
- Formulation of an Environmental Policy ☐
- Environmental Statement ☐
- Certification/Validation ☐
- None of the above ☐

Appendix A.1: English Questionnaire (ctd.)

5.9 Are you familiar with the following individual elements of the EN ISO 14001 Environmental Management System standard? (Tick more than one box if required)

Good Management Practices ☐

Environmental Audit ☐

Environmental Management System ☐

Environmental Review ☐

Formulation of an Environmental Policy ☐

Environmental Statement ☐

Certification/Validation ☐

None of the elements above ☐

5.10 Which of the above listed EN ISO 14001 Environmental Management System standards have already been introduced in your firm? (Tick more than one box if required or N/A if you are not introducing EN ISO 14001)

Good Management Practices ☐

Environmental Audit ☐

Environmental Management System ☐

Environmental Review ☐

Formulation of an Environmental Policy ☐

Environmental Statement ☐

Certification/Validation ☐

N/A ☐

5.11 Does your firm have an environmental programme and have environmental responsibilities been assigned to the workers?

Yes, this has already been achieved ☐

Partially; this will be completed within the next three years ☐

No ☐

Appendix A.1: English Questionnaire (ctd.)

5.12 Has an Environmental Committee, an Environmental Team or an Environmental Working Group been formed within your firm?

Yes ☐

No ☐

5.13 Who shares in the development and implementation of environmental measures in your firm? (Tick more than one box if required)

Company Management ☐

Company Directors ☐

Environmental Committee ☐

Environmental Department ☐

Environmental Manager/Officer ☐

Quality Management Manager/Officer ☐

Health and Safety Manager/Officer ☐

Works/Factory Council or Committee ☐

Each Employee ☐

Another: _____ ☐

No one ☐

5.14 Does your firm use any other type of Management System? (Tick more than one box if required)

Quality Management System based on ISO 9000 series ☐

Management System based on Health and Safety regulation ☐

In-house developed Environmental Management System ☐

Other Management/Environmental Reporting System:

_____ ☐

None to date ☐

6. Support for Implementing Corporate Environmental Management

6.1 Have you had experience of external advice or support?

Yes, advice in environmental issues ☐

Yes, advice in other business areas ☐

No such advice or support ☐

6.2 Has your general experience of external advice or support been predominantly positive or negative?

very positive	positive	neither nor	negative	very negative
1	2	3	4	5
☐	☐	☐	☐	☐

6.3 If you were about to set up an Environmental Management System in your firm would you seek external advice?

Yes ☐

No ☐

Don't Know ☐

IF YOU ALREADY HAVE AN ENVIRONMENTAL MANAGEMENT SYSTEM <u>GO TO QUESTION 6.6</u>

6.4 If 'Yes' or 'Don't Know', what type of advice/support do you believe you would need? (Tick more than one box if required)

Advice in a technical area ☐

Direct support implementing the environmental program ☐

Advice on staff selection and organisation when introducing/ maintaining environmental protection at work ☐

Preliminary advice on corporate environmental management ☐

Advising/Coaching the Environmental Management Representative ☐

Appendix A.1: English Questionnaire (ctd.)

In-house Staff Training	☐
External Staff Training	☐
Advice on environmental legislation	☐
Advising/coaching company directors on implementing environmental management	☐
Comprehensive measures aimed at organisational development	☐
Other: _____	☐

6.5 From whom would you anticipate receiving support when implementing environmental management in your company? (Tick up to four (4) boxes if required)

Chamber of Commerce	☐
Trade Associations	☐
Financial Organisation/Credit Company	☐
Government Institutions (eg, DETR, Environment Agency, TEC)	☐
Environmental Organisations (eg, Groundwork Trust)	☐
Scientific/Academic Institutions	☐
Other Organisations	☐
Other: _____	☐
No one	☐

GO TO QUESTION 7

Appendix A.1: English Questionnaire (ctd.)

6.6 What type of EMS advice/support would you recommend that firms receive? (Tick more than one box if required)

- Advice in a technical area ☐
- Direct support implementing the environmental program ☐
- Advice on staff selection and organisation when introducing/ maintaining environmental practice at work ☐
- Preliminary advice on corporate environmental management ☐
- Advising/Coaching the Environmental Management Representative ☐
- In-house Staff Training ☐
- External Staff Training ☐
- Advice on environmental legislation ☐
- Advising/coaching company directors on implementing environmental management ☐
- Comprehensive measures aimed at organisational development ☐
- Other: _____ ☐

6.7 From whom did you receive support when implementing environmental management in your company? (Tick up to four (4) boxes if required)

- Chamber of Commerce ☐
- Trade Associations ☐
- Financial Organisation/Credit Company ☐
- Government Institutions (eg, DETR, Environment Agency, TEC) ☐
- Environmental Organisations (eg, Groundwork Trust) ☐
- Scientific/Academic Institutions ☐
- Other Organisations ☐
- Other: _____ ☐
- No one ☐

7. Conclusion

7.1 Would you like me to send you the results of this questionnaire?

Yes (Please enclose the name/address of addressee) ☐

No ☐

7.2 Please use this space for any additional comments you would like to make. Thank you very much for your support.

Appendix A.2: German Questionnaire

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Einleitung zum Fragebogen

Die Bearbeitung des Fragebogens wird etwa 30 Minuten in Anspruch nehmen.

Bitte geben Sie mehrere Werte an, wenn Mehrfachnennungen gefragt sind, ansonsten bitte nur eine Auswertung pro Aussage ankreuzen.

Bei der Ausfüllung dieses Fragebogens sind keine spezifischen Umweltkenntnisse vorausgesetzt. Daher empfehlen wir, daß Sie versuchen, alle Fragen zu beantworten.

Wenn Sie den Ergebnisbericht dieser Forschung bekommen wollen, dann kreuzen Sie bitte die 'Ja' Kiste in Frage 7.1 an und legen Sie uns Ihre Postanschrift bei.

Wir würden es sehr schätzen, wenn Sie diesen Fragenbogen innerhalb von 10 Tagen nach Empfang zurückschicken würden.

Im voraus vielen Dank!

Appendix A.2: German Questionnaire (ctd.)

Fragebogen: Umweltmanagement in kleinen und mittleren Unternehmen

1. Ihr Unternehmen

1.1 Ihre Stellung in Ihrem Unternehmen

- Geschäftsführer ☐
- Umweltbeauftragter ☐
- Betriebsbeauftragter für den Umweltschutz ☐
- Abteilungsleiter ☐
- sonstige: _____ ☐

1.2 Höchste Abschlußprüfung

- Mittlere Reife ☐
- Abitur ☐
- Universitätsabschluß ☐
- sonstige: _____ ☐

1.3 Beschäftigte im Unternehmen

- 1 - 9 ☐
- 10 - 49 ☐
- 50 - 99 ☐
- 100 - 249 ☐
- 250 - 500 ☐

1.4 Industriezweig

- Chemie, Gummi, Kunststoffe ☐
- Maschinen-/ Anlagenbau ☐
- Verlage, Druck, Papier ☐
- Nahrungs-/Genußmittel ☐

Appendix A.2: German Questionnaire (ctd.)

2. Unternehmensführung

2.1 Wie zufrieden sind Sie mit Ihrem letzten Jahresabschluß?

sehr zufrieden	zufrieden	weder noch	unzufrieden	sehr unzufrieden
1	2	3	4	5
☐	☐	☐	☐	☐

2.2 Welche Umsatzerwartung haben Sie für die vor Ihnen liegenden drei Jahre ?

sehr positiv	positiv	weder noch	negativ	sehr negativ
1	2	3	4	5
☐	☐	☐	☐	☐

2.3 Wie bewerten Sie die folgenden Planungsziele für Ihr Unternehmen? Kreuzen Sie bitte die drei für Ihr Unternehmen in den kommenden drei Jahren wichtigsten Ziele an.

Diversifikation ausbauen ☐

Marketing/Absatz fördern ☐

in Produktionstechnologien investieren ☐

Verbesserung der Unternehmenskultur/-kommunikation ☐

Kosten senken ☐

Verbesserung der Motivation und Qualifikation der Mitarbeiter ☐

EDV modernisieren ☐

Qualitätssicherung weiterentwickeln ☐

Stärkung der F & E- Tätigkeit ☐

Verbesserung der Wettbewerbsfähigkeit ☐

Umweltschutzaktivitäten verstärken ☐

Produktinnovation fördern ☐

Appendix A.2: German Questionnaire (ctd.)

2.4 Welche Zielsetzungen standen bisher bei Investitionen für den Umweltschutz in Ihrem Unternehmen im Vordergrund? (Mehrfachnennungen möglich)

Kosteneinsparungen ☐

Minderung der Haftungsrisiken ☐

Image- und Marketingaspekte ☐

Ökologisierung des Unternehmens ☐

Erhaltung der Wettbewerbsvorteile ☐

Gewinnung neuer Kunden ☐

anderes (z.B. Erhaltung behördlicher Auflagen):

_____ ☐

bisher keine ☐

Appendix A.2: German Questionnaire (ctd.)

3 Ihre Einstellung zur Umwelt

3.1 Inwieweit stimmen Sie den folgenden Aussagen über Umweltprobleme in Ihrem Unternehmen zu?

		voll	überwiegend	weder noch	kaum	nicht
		1	2	3	4	5
A.	"Die Sorge um einen sicheren Arbeitsplatz ist bedrückender als der Gedanke an die Zukunft der Umwelt."	☐	☐	☐	☐	☐
B.	"Strenge Umweltvorschriften stellen eine Kostenbelastung dar, die unvermeidlich zum Abbau von Arbeitsplätzen führt".	☐	☐	☐	☐	☐
C.	"Das Problem der Umweltverschmutzung wird durch technologischen Fortschritt gelöst werden".	☐	☐	☐	☐	☐
D.	"Umwelt-ignorante Unternehmungsführung gefährdet die Überlebenschancen solcher Firmen in der absehbaren Zukunft."	☐	☐	☐	☐	☐
E.	"Steigende Umweltschutzkosten beeinträchtigen unseren Wohlstand und, als Folge, die nationale Wirtschaftskraft."	☐	☐	☐	☐	☐
F.	"Das Ausmaß der Umweltprobleme wird durch die Medien zu hoch gespielt."	☐	☐	☐	☐	☐
G.	"Wir leben in einer Gesellschaft, in der die Schattenseiten des Fortschritts immer mehr die Natur von Umweltdebatten bestimmen."	☐	☐	☐	☐	☐
H.	"Alle Arbeitnehmer sollen, als Teil der Berufsausbildung, über Umweltschutz belehrt werden."	☐	☐	☐	☐	☐
I.	"Die ständige Ausbeutung der Natur durch materielles Kapital bereitet den natürlichen Ressourcen, von denen alle Gesellschaften abhängig sind, unheilbare Schäden."	☐	☐	☐	☐	☐
J.	"Die Auswirkungen der modernen Technik sind eher positiv als negativ."	☐	☐	☐	☐	☐

Appendix A.2: German Questionnaire (ctd.)

3.2 Umweltaktivitäten in Unternehmen sind von unterschiedlichen Faktoren bestimmt. Inwieweit stimmen Sie den folgenden Aussagen über die Durchführung von Umweltpraktiken in Ihrer Firma zu?

		voll	über-wiegend	weder noch	kaum	nicht
		1	2	3	4	5
A.	"Die Sicherung von Arbeitsplätzen und ökonomischem Erfolg ist unserer Firma von größter Bedeutung."	☐	☐	☐	☐	☐
B.	"Umfassende ökologische Unternehmensführung ist anhand erhöhter Umwelthaftungsrisikos erforderlich."	☐	☐	☐	☐	☐
C.	"Langfristiger und wirtschaftlicher Erfolg in unserem Unternehmen ist ohne Berücksichtigung von Umweltmaßnahmen unvorstellbar."	☐	☐	☐	☐	☐
D.	"Hochqualifizierte Arbeitskräfte fühlen sind unserer Firma gegenüber angezogen wegen unseres umweltgerechten Produktionsverfahrens."	☐	☐	☐	☐	☐
E.	"Der Umweltschutzstandard in unserer Industrie ist zu streng; wir werden unsere Wettkampfsfähigkeit verlieren, wenn dieser Trend sich fortsetzt."	☐	☐	☐	☐	☐
F.	"Die Einführung von umweltpolitischen Maßnahmen hat uns gezwungen, uns durch unternehmensinterne Umweltpraktiken anzupassen."	☐	☐	☐	☐	☐

Appendix A.2: German Questionnaire (ctd.)

3.3 Inwieweit stimmen Sie den folgenden Aussagen über den politischen, bzw legislativen Einfluß auf Umweltverhalten in Ihrem Industriezweig zu?

		voll	überwiegend	weder noch	kaum	nicht
		1	2	3	4	5
A.	"Das Umweltverhalten in unserem Industriezweig wird von ordnungsrechtlichen Ge- und Verboten wesentlich bestimmt."	☐	☐	☐	☐	☐
B.	"Umweltprobleme werden primär industriell produziert, aber die Problemlösungen sind dem politischen System zugeschoben."	☐	☐	☐	☐	☐
C.	"Der Druck des Gesetzgebers hat die Unternehmungen in unserem Industriezweig zum Umweltschutz motiviert."	☐	☐	☐	☐	☐
D.	"Die Durchführung des Vorsorgeprinzips hat das Umweltverhalten in unserem Industriezweig wesentlich bestimmt."	☐	☐	☐	☐	☐
E.	"Die Durchführung des Verursacherprinzips hat das Umweltverhalten in unserem Industriezweig wesentlich bestimmt."	☐	☐	☐	☐	☐
F.	"Die Durchführung des Kooperationsprinzips zwischen Firmen hat das Umweltverhalten in unserem Industriezweig wesentlich bestimmt."	☐	☐	☐	☐	☐
G.	"Ökonomische Instrumente in der Form von Umweltabgaben, -genehmigungen und zertifikaten haben das Umweltverhalten in unserem Industriezweig wesentlich bestimmt."	☐	☐	☐	☐	☐
H.	"Ordnungsrechtliche Ge- und Verbote im Umweltbereich haben die Grenze ihrer Wirksamkeit erreicht."	☐	☐	☐	☐	☐

Appendix A.2: German Questionnaire (ctd.)

4. Unternehmenskultur und Umweltorientierung

4.1 Inwieweit stimmen Sie den folgenden Aussagen über Ihre Unternehmenskultur zu?

		voll 1	überwiegend 2	weder noch 3	kaum 4	nicht 5
A.	"Wir werden oft wegen unseres Kundendienstes gelobt."	☐	☐	☐	☐	☐
B.	"Wir sind immer mit den aktuellsten Umweltschutzverordnungen in unserer Branche vertraut."	☐	☐	☐	☐	☐
C.	"Unser Unternehmen tut viel für die Umwelt."	☐	☐	☐	☐	☐
D.	"Umweltschutz ist hier wichtiger als Unternehmergewinn."	☐	☐	☐	☐	☐
E.	"Fast alle Mitarbeiter sind an Verbesserungsmöglichkeiten des Unternehmens interessiert."	☐	☐	☐	☐	☐
F.	"In unserem Unternehmen ist der Umweltschutz Pflichtfach in der Berufsausbildung."	☐	☐	☐	☐	☐
G.	"Wir haben viele Verbesserungsvorschläge zu umweltbewußter Praxis in unserem Unternehmen angenommen."	☐	☐	☐	☐	☐
H.	"Umfassende und praktische Informationen über Umweltschutz stehen allen Arbeitnehmern frei zur Verfügung."	☐	☐	☐	☐	☐
I.	"Der Umweltschutzbeauftragte hat in unserem Unternehmen großen Einfluß."	☐	☐	☐	☐	☐
J.	"Alle Mitarbeiter sind über wichtige Zukunftspläne des Unternehmens gut gut informiert."	☐	☐	☐	☐	☐

Appendix A.2: German Questionnaire (ctd.)

		voll	über-wiegend	weder noch	kaum	nicht
		1	2	3	4	5
K.	"In diesem Unternehmen sind die Umweltschutzrechtlinien klar und verständlich."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
L.	"Alle Mitarbeiter sind verpflichtet Ausbildungskurse in ihrem Arbeitsbereich regelmäßig zu besuchen."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
M.	"Wir werden oft wegen unserer Umweltschutzinitiativen gelobt."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
N.	"Unser Unternehmen diskutiert Umweltschutzprobleme und derer Verbesserungen mit anderen Firmen."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
O.	"In unserem Unternehmen werden Vorbereitungen und Training für Störfallsituationen regelmäßig durchgeführt."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
P.	"Wir ermuntern andere Firmen eine unternehmensinterne Umweltstrategie wie unsere zu adoptieren."	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

4.2 Ist der Umweltschutz in <u>Ihren</u> Unternehmensleitlinien schriftlich festgelegt?

ja ☐

nein ☐

Appendix A.2: German Questionnaire (ctd.)

4.3 Welche Maßnahmenbereiche im Umweltschutz sind zur Zeit für Ihr Unternehmen von Bedeutung? Bewerten Sie bitte die Maßnahmenbereiche nach der Wichtigkeit für Ihr Unternehmen.

	sehr wichtig 1	wichtig 2	weder noch 3	unwichtig 4	sehr unwichtig 5
Energieeinsparung und Steigerung der Energieeffizienz	☐	☐	☐	☐	☐
umweltorientierte Auswahl und Transport von Rohstoffen	☐	☐	☐	☐	☐
Wiederverwertung von Abfällen	☐	☐	☐	☐	☐
Verminderung/Vermeidung von Abfällen	☐	☐	☐	☐	☐
Wassser- und Abwassereinsparung	☐	☐	☐	☐	☐
Umgang mit wassergefährdenden Stoffen	☐	☐	☐	☐	☐
Kontrolle und Verringerung von Emissionen	☐	☐	☐	☐	☐
Änderung bestehender Produktionsverfahren	☐	☐	☐	☐	☐
Einführung neuer Produktionsverfahren	☐	☐	☐	☐	☐
umweltgerechte Produktgestaltung	☐	☐	☐	☐	☐
ökologische Produktentwicklung	☐	☐	☐	☐	☐

Appendix A.2: German Questionnaire (ctd.)

	sehr wichtig 1	wichtig 2	weder noch 3	unwichtig 4	sehr unwichtig 5
Verbesserung des betrieblichen Umweltschutzes bei Auftragnehmern und Lieferanten	☐	☐	☐	☐	☐
Verhütung und Begrenzung umweltschädigender Unfälle/Störfälle (Gefahrenvorsorge)	☐	☐	☐	☐	☐
Information und Schulung des Personals in bezug auf ökologische Fragestellungen	☐	☐	☐	☐	☐
Verbesserung der technischen Ausstattung	☐	☐	☐	☐	☐
umweltgerechter Einkauf	☐	☐	☐	☐	☐
verstärkte Kontrolle von umweltrelevanten Tätigkeiten	☐	☐	☐	☐	☐

4.4 Wenn Sie an die Einführung von Umweltmanagement in Ihrem Unternehmen denken, welche Probleme befürchten Sie? (Mehrfachnennungen möglich)

- organisatorische Probleme ☐
- Überschneidungen mit anderen Managementsystemen ☐
- Mehrarbeit für die Mitarbeiter ☐
- Widerstände bei betrieblichen Vorgesetzen ☐
- "Ärger" im Betrieb ☐
- Kostensteigerung ☐
- Widerstände bei der Unternehmensleitung ☐

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Informations- und Schulungsbedarf ☐

Widerstände bei den Mitarbeitern ☐

Überforderung bei der Informationsbeschaffung ☐

zu geringe Unterstützung von außen (Verbände, Innungen, usw) ☐

andere: _____ ☐

keine Probleme ☐

4.5 Wenn Sie an die Einführung von Umweltmanagement denken, welche Vorteile erwarten Sie für Ihr Unternehmen (Mehrfachnennungen möglich)

besseres Unternehmensimage ☐

Risikominderung im Sinne des Umwelthaftungsgesetztes ☐

Verbesserung der Wettbewerbsfähigkeit ☐

Ressourceneinsparung ☐

umweltverträgliche Produkte ☐

höhere Motivation der Mitarbeiter ☐

Berücksichtigung veränderter Kundenwünsche ☐

Erhaltung der Marktposition ☐

Kosteinsparung ☐

andere: _____ ☐

keine Vorteile ☐

4.6 Wer fördert oder fordert am stärksten die Verbesserung des Umweltschutzes in Ihrem Unternehmen? (Mehrfachnennungen möglich)

Mitarbeiter ☐

betriebliche Vorgesetzte ☐

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Umweltschutzbeauftragte(r)	☐
Betriebsrat/ausschuß	☐
Unternehmensleitung	☐
Lieferanten	☐
Kunden	☐
Behörden	☐
Gesetzgeber	☐
andere: _____	☐
niemand	☐

Appendix A.2: German Questionnaire (ctd.)

5. Umweltmanagement im Unternehmen

5.1 Haben Sie in Ihrem Unternehmen schon ein Umweltmanagementsystem eingeführt?

ja, schon eingeführt ☐

wird in nächsten drei Jahren aufgebaut ☐

nein ☐

5.2 Sind Sie gesetztlich verpflichtet, die Verantwortlichkeit für Umweltschutz-aufgaben innerbetrieblich zu organisieren?

ja ☐

nein ☐

weiß nicht ☐

5.3 Kennen Sie die EG-Öko-Audit Verordung?

ja ☐

teilweise ☐

nein ☐

5.4 Streben Sie innerhalb der nächsten drei Jahre eine Zertifizierung nach nach der EG-Öko-Audit-Verordnung an?

ja ☐

nein ☐

weiß nicht ☐

5.5 Kennen Sie das Umweltmanagementsystem gemäß der Normenreihe EN ISO 14001?

ja ☐

teilweise ☐

nein ☐

Appendix A.2: German Questionnaire (ctd.)

5.6 Streben Sie innerhalb der nächsten drei Jahre eine Zertifizierung nach EN ISO 14001 an?

ja ☐

nein ☐

weiß nicht ☐

5.7 Sind Ihnen die einzelnen Elemente der EG-Öko-Audit-Verordnung vertraut? (Mehrfachnennungen möglich)

die "guten Managementpraktiken" ☐

Umweltbetriebsprüfung ☐

Umweltmanagementsystem ☐

Umweltprüfung ☐

"Formulierung einer Umweltpolitik" ☐

Umwelterklärung ☐

Zertifizierung/Validierung ☐

keine dieser Elemente ☐

5.8 Welche der genannten Maßnahmen haben Sie schon in Ihrem Unternehmen umgesetzt? (Mehrfachnennungen möglich)

die "guten Managementpraktiken" ☐

Umweltbetriebsprüfung ☐

Umweltmanagementsystem ☐

Umweltprüfung ☐

"Formulierung einer Umweltpolitik" ☐

Umwelterklärung ☐

Zertifizierung/Validierung ☐

keine dieser Elemente ☐

Appendix A.2: German Questionnaire (ctd.)

5.9 Sind Ihnen die einzelnen Elemente der Normenreihe EN ISO 14001 vertraut? (Mehrfachnennungen möglich)

- die "guten Managementpraktiken" ☐
- Umweltbetriebsprüfung ☐
- Umweltmanagementsystem ☐
- Umweltprüfung ☐
- "Formulierung einer Umweltpolitik" ☐
- Umwelterklärung ☐
- Zertifizierung/Validierung ☐
- keine dieser Elemente ☐

5.10 Welche der genannten Maßnahmen der Normenreihe EN ISO 14001 haben Sie schon in Ihrem Unternehmen umgesetzt? (Mehrfachnennungen möglich. Bitte "nicht zutreffend" ankreuzen, wenn Sie nicht beabsichtigen, EN ISO 14001 einzuführen)

- die "guten Managementpraktiken" ☐
- Umweltbetriebsprüfung ☐
- Umweltmanagementsystem ☐
- Umweltprüfung ☐
- "Formulierung einer Umweltpolitik" ☐
- Umwelterklärung ☐
- Zertifizierung/Validierung ☐
- nicht zutreffend ☐

5.11 Haben Sie ein Umweltprogramm und werden Umweltschutzaufgaben auf Mitarbeiter übertragen?

- ja, bereits geschehen ☐
- ja, in den nächsten drei Jahren ☐
- nein ☐

Appendix A.2: German Questionnaire (ctd.)

5.12 Haben Sie einen Ausschuß, ein Team oder eine Arbeitsgruppe für betrieblichen Umweltschutz eingerichtet?

ja ☐

nein ☐

5.13 Wer ist an der Umsetzung der Umweltschutzmaßnahmen in Ihrem direkt Unternehmen beteiligt (Mehrfachnennungen möglich)

betriebliche Vorgesetze ☐

Gescchäftsleitung ☐

Umweltausschuß ☐

Abteilung Umweltschutz ☐

Umweltschutzbeauftragter ☐

Beauftragter für Qualitätsmanagement ☐

Beauftragter für Arbeitsschutz ☐

Betriebsrat/ausschuß ☐

jeder Mitarbeiter ☐

andere: _____ ☐

niemand ☐

5.14 Sind in Ihrem Unternehmen andere Managementsysteme eingeführt worden? (Mehrfachnennungen möglich)

Qualitätsmanagement nach ISO 9000 ff ☐

Arbeitsschutz- und Gesundheitsschutz-Organisation ☐

Innerbetriebliche Organisation des Umweltschutzes im Sinne des § 52a BimSchG (Umwelt-Handbuch) ☐

andere Managementsystem:

_____ ☐

nein, bisher keine ☐

6. Unterstützung bei der Umsetzung von betrieblichem Umweltmanagement

6.1 Haben Sie in Ihrem Unternehmen schon Erfahrungen mit externer Beratung oder Unterstützung gesammelt?

ja, mit Umweltberatung ☐

ja, mit Beratung in anderen Bereichen ☐

nein, noch keine Erfahrung ☐

6.2 Wenn Sie Erfahrung mit externer Beratung/Unterstützung gesammelt haben, sind diese Erfahrungen überwiegend positiv oder negativ?

sehr positiv	positiv	weder noch	negativ	sehr negativ
1	2	3	4	5
☐	☐	☐	☐	☐

6.3 Planen Sie, bei der Umsetzung des Umweltmanagements externe Beratung in Anspruch zu nehmen?

ja ☐

nein ☐

weiß nicht ☐

WENN SIE SCHON EIN UMWELTMANAGEMENTSYSTEM HABEN, DANN ÜBERSPRINGEN SIE BITTE FRAGEN 6.4 UND 6.5

6.4 Wenn 'ja' oder 'weiß nicht', welche Art von Beratung/Unterstützung brauchen Sie (Mehrfachnennung möglich)

Beratung im technischen Bereich ☐

direkte Unterstützung bei der Umsetzung des Umweltprogramms ☐

Beratung im Bereich Aufbau-/Ablauforganisation im Umweltschutz ☐

eine Initialberatung zum betrieblichen Umweltmanagement ☐

Beratung/Coaching des Umweltschutzbeauftragten ☐

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Schulung der Mitarbeiter im Hause ☐

Schulung der Mitarbeiter außer Hause ☐

Beratung im juristischen Bereich ☐

Beratung/Coaching der Geschäftsführung bei der Umsetzung des Umweltmanagements ☐

umfassende Maßnahmen zur Organisationsentwicklung ☐

andere: _____ ☐

6.5 Von wem erwarten Sie Unterstützung bei der Umsetzung von Umweltmanagement in Ihrem Betrieb? (Mehrfachnennung möglich, bitte nicht mehr als 4 Angaben)

IHK/HWK ☐

Branchenverbände ☐

Kreditwirtschaft ☐

staatliche Einrichtungen/Behörden ☐

umweltorientierte Unternehmensverbände (future, BAUM, Unternehmensgrün) ☐

wissenschaftliche Einrichtungen/Hochschulen ☐

andere Unternehmen ☐

andere: _____ ☐

niemand ☐

ÜBERSPRINGEN SIE BITTE FRAGEN 6.6 UND 6.7

Appendix A.2: German Questionnaire (ctd.)

6.6 Wenn Sie schon ein Umweltmanagementsystem haben, welche Art von UMS Beratung/Unterstützung für Firmen würden Sie empfehlen? (Mehrfachnennungen möglich)

- Beratung im technischen Bereich ☐
- direkte Unterstützung bei der Umsetzung des Umweltprogramms ☐
- Beratung im Bereich Aufbau-/Ablauforganisation im Umweltschutz ☐
- eine Initialberatung zum betrieblichen Umweltmanagement ☐
- Beratung/Coaching des Umweltschutzbeauftragten ☐
- Schulung der Mitarbeiter im Hause ☐
- Schulung der Mitarbeiter außer Hause ☐
- Beratung im juristischen Bereich ☐
- Beratung/Coaching der Geschäftsführung bei der Umsetzung des Umweltmanagements ☐
- umfassende Maßnahmen zur Organisationsentwicklung ☐
- andere: _____ ☐

6.7 Von wem haben Sie Unterstützung bei der Umsetzung von Umweltmanagement in Ihrem Betrieb erhalten? (Mehrfachnennung möglich, bitte nicht mehr als 4 Angaben)

- IHK/HWK ☐
- Branchenverbände ☐
- Kreditwirtschaft ☐
- staatliche Einrichtungen/Behörden ☐
- umweltorientierte Unternehmensverbände (future, BAUM, Unternehmensgrün) ☐
- wissenschaftliche Einrichtungen/Hochschulen ☐
- andere Unternehmen ☐
- andere: _____ ☐
- niemand ☐

Appendix A.2: German Questionnaire (ctd.)

7. Zum Schluß:

7.1 Möchten Sie den Ergebnisbericht zu dieser Befragung zugeschickt bekommen?

ja (Dann legen Sie bitte Ihre Postanschrift separat bei) ☐

nein ☐

7.2 Falls Sie Vermerke machen möchten, steht Ihnen die folgende Seite zur Verfügung. Vielen Dank für Ihre Unterstützung.

Appendix A.3: English Telephone Questionnaire

QUESTIONNAIRE REFUSAL

Industry Sector:
Chemical/Rubber/Plastics ☐ Machinery ☐ Publishing/Printing/Paper ☐ Food/ Beverages ☐

Company Size
1-9 ☐ 10-49 ☐

Are you happy with your environmental performance? Yes ☐ No ☐

1. Grounds for Postal Questionnaire Refusal:

(i) Just not interested ☐ (ii) No time to complete a questionnaire ☐
(iii) We don't generally fill out questionnaires ☐ (iv) Our environmental representative not available ☐

2. Does your company already use an Environmental Management System ?
Yes ☐ No ☐

3. Are you familiar with the European Union Eco-Management and Audit Scheme (EMAS) regulation?: Yes ☐ Partial ☐ No ☐

4. Are you familiar with the Environmental Management System guidelines as outlined by BS 7750 or ISO 14001? Yes ☐ Partial ☐ No ☐

5. Are you planning to secure EMAS certification within the next three (3) years?: Yes ☐ No ☐ Don't know ☐

6. Are you planning to secure the ISO 14001 standard within the next three (3) years?: Yes ☐ No ☐ Don't Know ☐

7. Who is the most influential in promoting or driving environmental protection improvements in your firm?

Members of staff	☐	Company Management	☐	Environmental Manager	☐
Works Council/Committee	☐	Company Directors	☐	Suppliers	☐
Customers	☐	Local Authorities	☐	Legislators	☐
Other	☐	No one	☐		

8. When thinking about implementing environmental management in your firm, which problems do/did you envisage?

Organising personnel	☐	Conflicts with other management systems			☐
Extra work for staff	☐	Resistance on the part of management			☐
Inconvenience all round	☐	Increase in company costs			☐
Resistance (Company Directors)	☐	Environmental information and training needs			☐
Opposition by the workers	☐	An overburdening requirement to produce information			☐
Limited external support	☐	Other	☐	No problems	☐

9. What advantages do you anticipate will follow from introducing environmental management in your firm?

An improved company image	☐	Risk reduction in terms of environmental liability			☐
Improved competitive prowess	☐	Resource savings			☐
More environmentally-friendly products	☐	Increased staff motivation			☐
Maintenance of market position	☐	Greater consideration of changing customer demands			☐
Cost savings	☐	Other	☐	No advantages	☐

10. From whom did you/would you expect to receive support when implementing environmental management in your company?

Chamber of Commerce	☐	Trade Associations	☐	Credit Company	☐
Government Institutions	☐	Environmental Organisations	☐	Scientific/Academic Ins	☐
Other organisations	☐	No one	☐		

Appendix A.3: German Telephone Questionnaire

FRAGEBOGENABSAGEN

Industriezweig:
Chemie/Gummi/Kunst ☐ Machinen/Anlagenbau ☐ Verlage/ Druck/Papier ☐ Nahrungs/Genußmittel ☐

Beschäftigte im Unternehmen
1-9 ☐ 10-49 ☐

Sind Sie mit Ihrer Umweltleistung zufrieden? Ja ☐ Nein ☐

1. **Gründe für Fragebogenabsage:**

(i) Kein Interesse daran ☐ (ii) Keine Zeit, um einen Fragebogen auszufüllen ☐
(iii) Wir füllen in der Regel keine Fragebögen aus ☐ (iv) Die Bezugsperson ist nicht verfügbar ☐

2. **Haben Sie schon in Ihrem Unternehmen ein Umweltmanagementsystem eingeführt?:** Ja ☐ Nein ☐

3. **Kennen Sie das Umweltmanagementsystem nach der EG Öko-Audit-Verordnung (EMAS)?** Ja ☐ teilweise ☐ Nein ☐

4. **Kennen Sie das Umweltmanagementsystem nach der Normenreihe EN ISO 14001?** Ja ☐ teilweise ☐ Nein ☐

5. **Streben Sie innerhalb der nächsten drei Jahre eine Zertifizierung nach der EG Öko-Audit-Verordnung?** Ja ☐ Nein ☐

6. **Streben Sie innerhalb der nächsten drei Jahre eine Zertifizierung gemäß der Normenreihe EN ISO 14001?** Ja ☐ Nein ☐ weiß nicht ☐

7. **Wer fördert oder fordert am stärksten die Verbesserung des Umweltschutzes in Ihrem Unternehmen?**

Mitarbeiter	☐	betriebliche Vorgesetzte	☐	Umweltschutzbeauftragte	☐
Betriebsrat/ausschuß	☐	Unternehmensleitung	☐	Lieferanten	☐
Kunden	☐	Behörden	☐	Gesetzgeber	☐
Andere	☐	niemand	☐		

8. **Wenn Sie an die Einführung von Umweltmanagement in Ihrem Unternehmen denken, welche Probleme befürchten Sie?**

organisatorische Probleme	☐	Überschneidung mit anderen Managementsystemen			☐
Mehr Arbeit für die Mitarbeiter	☐	Widerstände bei betrieblichen Vorgesetzen			☐
'Ärger' im Betrieb	☐	Kostensteigerung			☐
Widerstände (Unternehmensleitung)	☐	Informations- und Schulungsbedarf			☐
Widerstände bei den Mitarbeitern	☐	Überforderung bei der Informationsbeschaffung			☐
geringe externe Unterstützung	☐	andere Probleme	☐	keine Probleme	☐

9. **Wenn Sie an die Einführung von Umweltmanagement denken, welche Vorteile erwarten Sie für Ihr Unternehmen?**

besseres Unternehmensimage	☐	Risikominderung (Umwelthaftungsgesetz)			☐
Verbesserung der Wettbewerbsfähigkeit	☐	Ressourceneinsparung			☐
umweltverträgliche Produkte	☐	höhere Motivation der Mitarbeiter			☐
Berücksichtigung veränderter Kundenwünsche	☐	Erhaltung der Marktposition			☐
Kosteneinsparung	☐	andere Vorteile	☐	keine Vorteile	☐

10. **Von wem erwarten Sie Unterstützung bei der Umsetzung von Umweltmanagement in Ihrem Unternehmen?**

IHK/HWK	☐	Branchenverbände	☐
Kreditwirtschaft	☐	staatliche Einrichtungen	☐
umweltorientierte Unternehmensverbände	☐	andere Unternehmen	☐
wissenschaftliche Einrichtungen/Hochschulen	☐	niemand	☐

Appendix B.1: Letter of Introduction

The Open University
Walton Hall
Milton Keynes
MK7 6AA

Telephone (01908) 274066
Fax (01908) 653744
Telex 825061
Direct Line (01908) 65
Faculty Fax (01908) 654488

Faculty of Social Sciences

Date as Postmark

Dear

Further to our recent telephone conversation please find enclosed your questionnaire and a prepaid envelope. As you are now aware, at the Open University we are engaged in an investigative study concerned with the impacts of environmental legislation and attitudes towards environmental practices within Small and Medium-sized Enterprises (SMEs) in England and Germany.

Our analysis of general and specific SME experiences in these two countries will enable us to further explore the relationship between competitive and environmentally-conscious practices and assess the efficacy of Business Support Organisations as promoters of sustainable economic practice within the SME context.

It would be appreciated if this questionnaire was completed and returned in the enclosed prepaid envelope within ten days of its receipt. We emphasise that the contents of your completed questionnaire will be handled with utmost confidentiality and only evaluated in aggregate.

Once again I would like to use this opportunity to thank you for your support in advance.

Yours faithfully

Alan Halner
PhD Research Student

Encs

Appendix B.1: Letter of Introduction (ctd.)

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Faculty of Social Sciences

Datum des Poststempels

Sehr geehrter Herr

Wie schon während unseres Telefongesprächs vor kurzem erwähnt, bin ich ein englischer Doktorrand an der Open University, Milton Keynes, England. Ich führe ein komparatives Studium (Deutschland/England) im Bereich des Umweltschutzes durch, mit Schwerpunkt Umweltbewußtsein und Umweltpraxis unter kleinen und mittleren Unternehmen (KMU).

Wir hoffen, daß diese Analyse der allgemeinen und spezifischen Erfahrungen von KMU in Deutschland und England zu einer Auseinandersetzung der Wettbewerbs- und Umweltproblematik beitragen wird und auch uns erlauben wird die Leistung und Effektivität geschäftsunterstutzender Organisationen (Business Support Organisations) bei der Förderung nachhaltiger Entwicklung unter KMU zu beurteilen.

Ich wurde mich sehr freuen, wenn Sie diesen Fragebogen innerhalb von 2 Wochen beantworten könnten und in dem beigelegten Umschlag zurucksenden wurden. Ich versichere Ihnen, daß Ihre Angaben streng vertraulich behandelt werden und nur als "Gesamtwert" ausgewertet werden.

Ich möchte diese Gelegenheit nutzen Ihnen im voraus fur Ihre Unterstutzung zu danken.

Mit freundlichen Grußen

Alan Halner
PhD Research Student

Anlage

Appendix B.2: Company Interview Framework

INTRODUCTION

1.1 Introduce research topic
1.2 Outline structure of interview
1.3 Establish whether there are problems/concerns with interview before commencement

2 INTERVIEW

2.1 Description of Company
Role/responsibilities of interviewee
Establish what are considered to be the key environmental aspects and impacts of company

3 CORPORATE MANAGEMENT AND THE ENVIRONMENT

3.1 In surveys which evaluate corporate goals in terms of importance, including activities such as, promotion of marketing, improving company competitiveness, strengthening environmental activities and reducing costs, "strengthening environmental activities" as a corporate goal tends to be not a high priority. Do such surveys truly reflect the importance of environmental activities and engagement with environmental activities within your firm?

Should we conclude that notions such as sustainability are passing fads or a consideration during favourable economic circumstances?

3.2 If your environmental activities are coupled with more general or specific corporate goals, what are these goals and how do environmental activities relate to these goals?

3.3 To what extent are your personal views/concerns or satisfaction with the state of the physical environment reflected/informed by company practice under your control and in the company as a whole?

3.4 Is there a relationship between personal environmental attitudes or practices and company environmental attitudes or practices? Why do you so answer?

3.5 Do you believe that the media sufficiently highlight the environmental aspects of all our activities?

3.6 Do you believe that the link between environmental aspects of private and business activities is highlighted sufficiently?

4 GOVERNMENTAL POLICIES AND THE ENVIRONMENT

4.1 Can you provide examples of how your company behaviour has been influenced by:

The Polluter Pays Principle
The Precautionary Principle
Economic Instruments
Co-operative and voluntary practices

4.2 Who exerts the greatest pressure on the environmental practices within your company and how is this expressed?

(Could you name another stakeholder, and how...)

4.3 Which environmental or ecological measures have been introduced to your firm for which there is no legal liability? (list 3 or 4)

Why were these measures selected?; How were these measures identified?

4.4 Do you feel that your firm is familiar with all relevant environmental legislation/issues?

4.5 To which bodies/information sources do you refer in order to remain familiar with relevant environmental legislation and issues?

4.6 Do you feel that smaller companies are provided with sufficient support to ensure familiarity with environmental legislation and issues?

5 COMPANY ENVIRONMENTAL PERFORMANCE

5.1 Do you believe that expectations, governmental or otherwise, relating to SME environmental performance are too high?

5.2 Should the importance of corporate environmental performance be reinforced by the compulsory or voluntary training of all staff in environmental training?

5.3 Which environmental impact(s) has/have been the most difficult to control?

5.4 Is/Are the difficulty(ies) in your view related to methods of internal communication, training or competence of staff?

5.5 Who in your company is responsible for defining/communicating environmental activities?

5.6 To what extent have the elements of voluntary EMS such as ISO 14001 and EMAS been employed to address environmental issues in terms of your company's environmental aspects and impacts? (Environmental Audit/Review/Statement, Good Management Practice)
How easy was it/will it be to introduce these elements?

5.7 What are or would be the principle advantages of an EMS for your firm?

5.8 What are the key disadvantages of an EMS for your firm?

5.9 Do you believe that the costs in terms of training and implementing environmental systems outweigh the resource savings and other perceived benefits these systems bring?

5.10 What features of the/differences in the ISO 14001 standard and EMAS regulation make them attractive or unattractive to you as tools of environmental management and control?

5.11 What do you feel should be done to further promote environmental practice (i) in your industry (ii) amongst SMEs (iii) your firm.

5.12 Would you like to mention anything you feel should also be addressed?
Thank you.

Appendix B.2: Company Interview Framework (ctd.)

EINLEITUNG

1.1 Forschungsthema vorstellen
1.2 den Interviewrahmen skizzieren
1.3 Feststellen, ob der Betreffende Fragen/Sorgen hat, die mit diesem Interview verbunden sind

2 INTERVIEW

2.1 Was genau macht Ihr Unternehmen?
Welche Rolle spielen Sie in dem Unternehmen im allgemeinen; welche Verantwortung tragen Sie in bezug auf die Umweltvorgänge Ihrer Firma?
Was sind, Ihrer Meinung nach, die Hauptumweltaspekte und Hauptumweltauswirkungen der Tätigkeiten Ihres Unternehmens?

3 UMWELTMANAGEMENT IM UNTERNEHMEN

3.1 Ergebnisse von Umfragen bezüglich Unternehmensziele indizieren, daß das "Verstärken von Umweltaktivitäten", im Gegensatz zu anderen Zielen, wie "Marketing fördern", "Kosten senken" oder "Verbesserung von Wettbewerbsfähigkeit", keine Prioritätssache ist. Spiegeln solche Umfragen die Bedeutung von Umweltaktivitäten und Engagement mit Ökoaktivitäten in Ihrer Firma wider?
Soll man daraus schlußfolgern, daß Begriffe wie Nachhaltigkeit nur eine Masche des betrieblichen Managements ist, die man nur in Zeiten wirtschaftlichen Erfolgs praktiziert?

3.2 Wenn Ihre Umweltaktivitäten mit allgemeineren oder spezifischeren Unternehmenszielen gekoppelt sind, was sind diese Unternehmensziele und wie sind diese Ziele mit Umwelt-aktivitäten verbunden?

3.3 Inwieweit werden Ihre persönlichen Ansichten/Sorgen oder Zufriedenheit mit der Umwelt von der Unternehmensverfahrensweise widerspiegelt?

3.4 Besteht eine Beziehung zwischen persönlichen Umwelteinstellungen oder Praktiken und unternehmerischen Umweltseinstellungen oder Praktiken? Warum haben Sie so beantwortet?

3.5 Glauben Sie, daß die Medien genügend Schlaglicht auf die Umweltaspekte von all unseren Aktivitäten werfen?

3.6 Würden Sie sagen, daß die Beziehung zwischen Umweltaspekten von Privat und Geschäftsaktivitäten oft genug betont wird?

4 POLITIK UND DIE UMWELT

4.1 Können Sie Beispiele liefern von der Wirkung der folgenden Prinzipien und Instrumente auf Ihr Unternehmensverhalten: die Wirkung des:
Verursacherprinzips
Vorsorgeprinzips
Ökonomischen Instrumente
Kooperationsprinzips und freiwilligen Praktiken

4.2 Wer übt den größten Druck auf die Umweltpraktiken in Ihrem Unternehmen aus und in welcher Form kommt dieser Druck zum Ausdruck?

Gibt es andere Personen oder Organisationen, die auf Ihre Umweltpraktiken entscheidend wirken?

4.3 Welche Umwelt- oder ökologische Maßnahmen haben Sie in Ihre Firma eingeführt, die nichts mit Haftungsrisiken zu tun haben? (3 oder 4 nennen)

Warum wurden diese Maßnahmen eingeführt? Wie haben Sie diese Maßnahmen identifiziert?

4.4 Sind Sie der Meinung, daß Ihr Unternehmung mit der relevanten Umweltgesetzgebung und Angelegenheiten völlig vertraut ist?

4.5 Welche Organisationen/Informationsquellen benutzen Sie, um mit der relevanten Umweltgesetzgebung und Angelegenheiten vertraut zu bleiben?

4.6 Sind Sie der Meinung, daß kleinere Unternehmen mit zufriedenstellender Unterstützung versorgt werden, um Vertrautheit mit Umweltgesetzgebung und Angelegenheiten zu sichern?

5 BETRIEBLICHE UMWELTLEISTUNG

5.1 Meinen Sie, daß staatliche (oder andere) Erwartungen bezüglich der Umweltleistung von KMU zu hoch sind?

5.2 Soll die Wichtigkeit von betrieblicher Umweltleistung durch eine Umwelttrainingspflicht verstärkt werden, oder soll solches Training willkürlich bleiben?

5.3 Welche Umweltauswirkungen haben sich als höchst schwierig zu kontrollieren erwiesen?

5.4 Sind die gerade erwähnten Schwierigkeiten, nach Ihrer Ansicht, mit interner Kommunikation, Training oder Arbeitskraftkompetenz verbunden?

5.5 Wer definiert/kommuniziert die Umweltaktivitäten in Ihrem Unternehmen?

5.6 Inwieweit werden die Elemente von willkürlichen UMSs, wie ISO 14001 und EMAS angewandt, um Umweltangelegenheiten in Verbindung mit Umweltaspekten und Umweltauswirkungen in Ihrer Firma zu klären? Wie leicht war es/wird es sein, diese Elemente einzuführen? (Umweltbetriebsprüfung/Umweltprüfung/Umwelterklärung, Gute Managementpraktiken)

5.7 Welche Hauptvorteile hat ein UMS für Ihr Unternehmen/Welche Hauptvorteile wird ein UMS für Ihr Unternehmen haben?

5.8 Welche Hauptnachteile hat ein UMS für Ihr Unternehmen/Welche Hauptnachteile wird ein UMS für Ihr Unternehmen haben?

5.9 Meinen Sie, daß die Kosten eines Umweltmanagementsystems in der Form von Training und Implementation den Resourcengewinn und andere wahrnehmbare Vorteile des Umweltmanagementsystems überwiegen?

5.10 Welche unterschiedlichen Aspekte des ISO 14001 Standards und der EMAS Regulation tragen zu deren Wirksamkeit oder Unwirksamkeit als Werkzeuge des Umweltmanagements und Controlling bei?

5.11 Was soll man Ihrer Meinung nach tun, um gute Umweltpraktiken weiter zu fördern -
(i) in Ihrer Industrie (ii) unter KMU (iii) in Ihrem Unternehmen?

5.12 Möchten Sie etwas hinzufügen, daß Sie für erwähnenswert halten?
Vielen Dank für Ihre Zeit und Ihren Beitrag.

Appendix C

Table C.1: EMAS and EMAS-II Regulation Articles

1836/93	Article Title and Definition	761/2001
Article 1	**The eco-management and audit scheme and its objectives**: outlines the aims of EMAS in relation to legislation, technical standards and environmental controls.	Article 1
Article 2	**Definitions**: an explanation is provided for 15 commonly used terms within regulation EEC 1836/93 and 20 terms under 761/2001, such as 'environmental review', 'environmental statement', 'organisation', 'site'.	Article 2
Article 3	**Participation in the scheme**: the conditions are specified under which companies can engage in and register under the EMAS scheme[165]. EMAS-II, unlike its predecessor, is open to any organisation dedicated to improving its overall environmental performance as defined in Articles and Annexes under regulation 761/2001.	Article 3
Article 4	**Auditing and validation**: explains who may conduct an internal audit, how audit cycles are determined, and what constitutes an official audit by an accredited environmental verifier. In EMAS-II these issues are defined in Annex II.	Annex II
Article 5	**Environmental statement**: outlines when an environmental statement should be prepared, how it should be designed, what it should include, and the frequency of its production. In EMAS-II these issues are defined in Annex III.	Annex III
Article 6	**Accreditation and supervision of environmental verifiers**: defines the form that accreditation systems of environmental verifiers in Member States should assume, the standards of accreditation across Member States, and collaboration between Member States.	Article 4
Article 7	**List of accredited environmental verifiers**: outlines how, where and the frequencies of published lists of accredited verifiers.	Article 7
Article 8	**Registration of sites**: specifies how and why a competent body should register or deregister a site. Under EMAS-II Article 6 refers to 'registration of organisations'. An organisation is defined as a company, corporation, firm, enterprise, authority, institution or part thereof, in agreement with the environmental verifier. The smallest entity which can be considered for EMAS registration is a site. A site refers to all land at a distinct geographic location under the management control of an organisation covering activities, products, services and related infrastructure, equipment and materials.	Article 6
-	**Logos:** specifies the conditions under which organisations may use the EMAS-II Logo set out in Annexes III and IV.	Article 8
Article 9	**Publication of the list of registered sites**: specifies when and through which bodies lists of registered sites should be published.	Article 7
Article 10	**Statement of participation**: outlines the conditions under which companies may use statements of participation	Article 3, Annex III

Source: European Community Regulations 1836/93 and 761/2001

[165] Refer to Footnote No 128.

Table C.1: EMAS and EMAS-II Regulation Articles (ctd.)

1836/93	Article Title and Definition	761/2001
Article 11	**Costs and fees**: highlights the right of Member states to establish a fees system for administrative costs incurred through EMAS registration and accreditation.	Article 16
Article 12	**Relationship with national, European and international standards**: outlines the conditions under which companies implementing other standards comply with EMAS requirements.	Article 9
-	**Relationship with other environmental legislation in the Community:** Regulation 761/2001 explains the relationship between the implementation of EMAS-II and Community/national legislation or other enforcement authorities.	Article 10
Article 13	**Promotion of companies' participation, in particular of small and medium-sized enterprises**: specifies how Member States can and should encourage company participation in the EMAS scheme.	Article 11
Article 14	**Inclusion of other sectors**: highlights the circumstances enabling non-eligible sectors to engage in the scheme. No longer relevant under EMAS-II.	-
Article 15	**Information**: explains that each Member State is responsible for the dissemination of EMAS regulation content and objectives.	Article 12
Article 16	**Infringements**: indicates that each Member State is responsible for adopting appropriate legal and administrative measures in the case of non-compliance.	Article 13
Article 17	**Annexes/Revision**: indicates that Regulation annexes may be modified on the basis of Scheme experience.	Article 15
Article 18	**Competent bodies**: highlights that the designated competent body in each Member State should guarantee independence and neutrality.	Article 5
Article 19	**Committee**: specifies the conditions under which and the measures through which changes to the EMAS scheme can be made.	Article 14
Article 20	**Revision**: outlines the time required for the EMAS scheme to operate before a review and possible changes can be considered by the Committee.	Article 15
Article 21	**Entry into force**: states the date that the regulation is to come into force and its application to Members States.	Article 18
-	**Repeal of Regulation (EEC) No 1836/93:** specifies the requirements of Member States' Procedures, the Accreditation Systems within Member States, site verification extensions and performance of environmental verifiers following the repeal of Regulation (EEC) 1836/93.	Article 17

Source: European Community Regulations 1836/93 and 761/2001

Table C.1: EMAS and EMAS-II Regulation Articles (ctd.)

1836/93	Annex Description	761/2001
Annex I	**Requirements Concerning Environmental Policies, Programmes and Management Systems**: A. Environmental policies, objectives and programmes; B. Environmental Management System; C. Issues to be covered; D. Good Management practices.	-
Annex II	Requirements Concerning Environmental Auditing: A. Objectives; B. Scope; C. Organisation and resources; D. Planning and preparation for a site audit; E. Audit activities; F. Reporting audit findings and conclusions; G. Audit follow-up; H. Audit Frequency;	-
Annex III	Requirements Concerning the Accreditation of Environmental Verifiers and the Function of the Verifier: A. Requirements for the accreditation of environmental verifiers; B. The function of verifiers;	-
Annex IV	Statements of Participation	-
Annex V	Information to be provided to the Competent Bodies at the time for registration or submission of a subsequent validated Environmental Statement.	-
Annex IV	Statements of Participation	-
Annex V	Information to be provided to the Competent Bodies at the time for registration or submission of a subsequent validated Environmental Statement.	-
Annex I	**Requirements Concerning Environmental Policies, Programmes and Management Systems**: A. Environmental policies, objectives and programmes; B. Environmental Management System; C. Issues to be covered; D. Good Management practices.	-
Annex II	Requirements Concerning Environmental Auditing: A. Objectives; B. Scope; C. Organisation and resources; D. Planning and preparation for a site audit; E. Audit activities; F. Reporting audit findings and conclusions; G. Audit follow-up; H. Audit Frequency.	-
Annex III	Requirements Concerning the Accreditation of Environmental Verifiers and the Function of the Verifier: A. Requirements for the accreditation of environmental verifiers; B. The function of verifiers.	-
Annex IV	Statements of Participation	-
Annex V	Information to be provided to the Competent Bodies at the time for registration or submission of a subsequent validated Environmental Statement.	-

Source: European Community Regulations 1836/93 and 761/2001

Table C.1: EMAS and EMAS-II Regulation Articles (ctd.)

1836/93	Annex Description	76/2001
-	**Environmental Management System Requirements:** The management system defined at Article 2(k) is to be implemented according to EN ISO 14001 requirements: I-A-2. Environment Policy; I-A-3. Planning; I-A-4. Implementation and Operation; I-A-5. Checking and Corrective Action; I-A-6. Management Review; I-B Issues to be Addressed by Organisations Implementing EMAS I-B-1. Legal Compliance; I-B-2. Performance.	Annex I
-	**Requirements Concerning Internal Environmental Auditing** II.1 General Requirements; II.2 Objectives; II.3 Scope; II.4 Organisation and Resources; II.5 Planning and Preparing for an Audit; II.6 Audit Activities; II.7 Reporting Audit Findings and Conclusions; II.8 Audit Follow-up; II.9 Audit Frequency.	Annex II
-	**Environmental Statement:** III.1 Introduction; III.2 Environmental Statement; III.3 Criteria for Environmental Performance Reporting; III.4 Maintenance of Publicly Available Information; III.5 Publication of Information; III.6 Public Availability; III.7 Local Accountability.	Annex III
-	**Logo**	Article 8; Annex IV
-	**Accreditation, Supervision and Function of the Environmental Verifiers:** V.1 General; V.2 Requirements for the Accreditation of Environmental Verifiers; V.3 Supervision of Environmental Verifiers; V.4 The Function of Environmental Verifiers; V.5 Conditions for the Environmental to perform his/her Activities; V.6 Verification Frequency.	Annex V
-	**Environmental Aspects:** VI.1 General; VI.2 Direct Environmental Aspects; VI.3 Indirect Environmental Aspects; VI.4 Significance.	Annex VI
-	**Environmental Review:** VII.1 General; VII.2 Requirements.	Annex VII
-	**Registration Information:**	Annex VIII

Source: European Community Regulations 1836/93 and 761/2001

Table C.2: *Umweltauditgesetz* in relation to EC EMAS Regulation

UAG Article No (§)	Environmental Audit Law (*Umweltauditgesetz* (*UAG*))	Reference to EC Eco-Management and Audit Scheme (EMAS) Regulations
1	**Purpose of the Law**: outlines aims of the law to map EU Regulation 1836/93 in relation to German environmental legal framework.	
2	**Definitions**: explanation is provided for central terms in the regulation, including 'enterprise' , 'Environmental Verifier', Environmental Verifying organisations.	Article 2(i) Article 4(3-6) Article 6.
3	**Inclusion of non-industrial sectors**: explains the inclusion of non-industrial sectors in German EMAS provisions.[166].	Article 14, Annex IV.
4	**Requirements of Environmental Verifiers**: specifies the expectations of verifiers and the official working titles of verifiers. Federal Government has the legal right to more rigorously define the conditions of a verifier.	Article 5, Article 6, Article 7.
5	**Trustworthiness**: specifies the range of actions which contravene 'trustworthiness', eg, breaches of any of the listed environmental legislation, or loss of physical health.	
6	**Independence**: specifies the range of actions and relationships deemed 'improper' which compromise the independence of the verifier.	Annex III(A.2)
7	**Qualification Criteria**: highlights the qualification and experience requirements for env. verifiers.	Annex III(A.1)
8	**Certification of Expertees**: outlines the requirements of individuals not qualified as environmental verifiers although conducting some environmental verifier duties and of individuals who satisfy all qualification criteria.	
9	**Accreditation as Environmental Verifier**: details the conditions under which accreditation is possible, also with reference to *UAG* §4(1) §5, §6 and §7.	Article 4(6) Article 12(1.) Annex III(A.2) Annex III(B).
10	**Accreditation as Environmental Organisation**: prescribes the criteria governing memberships, partnerships and companies performing in the capacity of environmental verifying organisations, also with reference to *UAG* §5, §6, §7(2.2a) and §13.	Article 4(6) Article 12(1)' Annex III(A.1) Annex III(B).
11	**Certification and Accreditation Procedures**: frames the examination procedures for certification also with reference to *UAG* §7(2.2)§8, §9, §10, §12 and §13.	Annex III(A.4) Annex III(B)

Source: European Community Regulation 1836/93 and *Umweltauditgesetz*

[166] Refer also to *UAG-ErwV.*

Table C.2: *Umweltauditgesetz* in relation to EC EMAS Regulation, (ctd.)

UAG Article No (§)	Environmental Audit Law (*Umweltauditgesetz* (*UAG*))	Reference to EC Eco-Management and Audit Scheme (EMAS) Regulations
12	**Oral Examination:** defines conditions of oral examination for environmental accreditation, and the qualifications of the examiners with reference to *UAG* §21(1.2.2).	
13	**Training Courses and other relevant qualifications:** specifies requirements for environmental training courses to be recognised as official environmental verifier qualifications, and how courses can gain valid accreditation.	
14	**Environmental Verifier Accreditation Register:** explains the purpose and contents of the Accreditation Register, with reference to *UAG* §32(2).	Article 7.
15	**Supervision of Environmental Verifiers, Environmental Verifying Organisations and holders of Environmental Certificates:** outlines the procedures for supervising current environmental verifiers and regularity of provision, with reference to *UAG* §§8-10.	Annex III(B.2-6).
16	**Orders and Prohibitions:** describes the jurisdiction of the Accreditation Body over environmental verifiers in relation to supervisory or qualification issues, and documentation issues between verifiers and accredited companies, with reference to *UAG* §15(2 and 3).	Article 4(5.d) Article 5(3).
17	**De-registration and withholding Accreditation:** specifies the conditions under which accreditation may be revoked, with reference to *UAG* §4(3) §5(2.2, 2.3, 2.5) §6(2.1, 2.2) §9(1.2) §10(1.2).	Annex III A(4.d).
18	**Environmental Verifiers and Environmental Verifying Organisations from other Member States of the EU:** describes the conditions which enable environmental verifiers from other Member States to practice in Germany, with reference to *UAG* §15(2 and 4) §16.	Annex III A(5).
19	**Prohibition to validate Environmental Statements:** specifies the conditions which disqualify environmental verifiers from validating Environmental Statements, with reference to *UAG* §13.	Article 4(3)

Source: European Community Regulation 1836/93 and *Umweltauditgesetz*

Table C.2: *Umweltauditgesetz* in relation to EC EMAS Regulation, (ctd.)

UAG Article No (§)	Environmental Audit Law (*Umweltauditgesetz* (*UAG*))	Reference to EC Eco-Management and Audit Scheme (EMAS) Regulations
20	**Supervisory Procedures:** explains the right of the Federal Government, after consultation with the Environmental Verifier Committee, to modify the form and conditions of the *UAG* without consulting the Upper House, with reference to *UAG* §1(1.2) §15(2 and 3).	
21	**Functions of the Environmental Verifier Committee:** outlines the tasks of the Committee, including provision of legal guidelines for the *UAG*, consulting with *BUNR*, and reporting/consulting with the Accreditation Body.	
22	**Members of the Environmental Verifier Committee:** outlines membership, function and term of the Environmental Verifier Committee.	
23	**Proceedings, Presidency and Resolutions of the Environmental Verifier Committee:** outlines the terms, proceedings, chairmanship and voting procedures of the Committee, with reference to *UAG* §13 and §21(1.1-3).	
24	**Conflict Committee:** specifies the conditions requiring a Conflict Committee and the functionality of the Conflict Committee.	
25	**Procedures governing Conflict:** outlines the procedures governing decision making powers of the Conflict Committee.	
26	**Administrative Office:** highlights the function of an administrative office for the purposes of the Environmental Verifier Committee.	
27	**Legislative Supervisory Body:** defines the role and powers of the Supervisory Body over the Environmental Verifier Committee, with reference to *UAG* §21(1.2.1-3) §22(8).	
28	**Accreditation Body:** explains the provision of additional legal support available to the Accreditation Body.	
29	**Supervision of the Accreditation Body:** explains the supervisory function over the Accreditation Body.	
30	**Liability:** highlights compensation liability laws in relation to §323(2) of German Business Law (HGB).	
31	**Prohibitions on Statements of Participation and Logos:** explains the prohibitions and conditions for Logo use.	Article 10, Annex IV

Source: European Community Regulation 1836/93 and *Umweltauditgesetz*

Table C.2: *Umweltauditgesetz* in relation to EC EMAS Regulation, (ctd.)

***UAG* Article No (§)**	**Environmental Audit Law (*Umweltauditgesetz* (*UAG*))**	**Reference to EC Eco-Management and Audit Scheme (EMAS) Regulations**
32	**Registration of Sites:** describes the agreed responsibilities of the Chambers of Commerce and Crafts to register sites, including the compilation of relevant lists of registered sites to various authorities, with reference to the Environmental Information Law (*Umweltinformationsgesetz*).	Article 8, Article 9.
33	**Site Registration:** specifies the company requirements for entry into the Site Registration List and the official professional status of the verifier responsible for validating the Environmental Statement, with reference to *UAG* §13.	Article 8.
34	**Deletions and Suspensions from Site Register:** outlines the courses of action available to companies, accreditation bodies and competent enforcement bodies in the case of disputed site non-conformance.	Article 8(3) Article 8(4) Article 18(2.2).
35	**Registration Procedures:** stipulates that the Chambers of Commerce and Craft can introduce statutes to better control the registration and deletion of sites on their lists as agreed by Regional/Supervisory Authorities which will apply to both Chambers members and non-members.	Article 18(2).
36	**Costs:** provides the framework for funding the legal and administration costs associated with the *UAG* through the i and the Chambers, with reference to *UAG* §35.	
37	**Fines:** specifies two categories of fines resulting from infringements of the *UAG* in relation to competence and in relation to trust.	
38	**Interim Regulations:** outlines the relevance of current and modified *UAG* legislation, with reference to §3, §11(5.1 and 2) §12, §36, §28).	
39	**Entry into Force:** states the date the regulation is to come into force.	

Source: European Community Regulation 1836/93 and *Umweltauditgesetz*

Table C.3: ISO 14001 Environmental Management System Specification

Number	Clause Description
1	**Scope**: specifies the requirements of an EMS.
2	**Normative references**: none currently.
3	**Definitions**: defines expressions and ideas central to ISO 14001 standard guidelines, such as continual improvement, environmental aspect, organisation.
4	**Environmental Management System Requirements**: outlines the general and specific demands of an EMS in keeping with ISO 14001 guidelines: 4.1 **General Requirements** 4.2 **Environmental Policy** 4.3 **Planning**: specifies the issues and instruments which will be included in an EMS: 4.3.1 Environmental Aspects 4.3.2 Legal and other Requirements 4.3.3 Objectives and Targets 4.3.4 Environmental Management Programme(s) 4.4 **Implementation and Operation**: indicates operational activities that management should oversee in an EMS: 4.4.1 Structure and responsibility 4.4.2 Training, awareness and competence 4.4.3 Communication 4.4.4 EMS Documentation 4.4.5 Document Control 4.4.6 Operational Control 4.4.7 Emergency Preparedness and Response 4.5 **Checking and Corrective Action**: specifies ISO 14001 requirements for document and procedural control: 4.5.1 Monitoring and Measurement 4.5.2 Non Conformance and Corrective and Preventative Action 4.5.3 Records 4.5.4 Environmental Management System Audit 4.6 **Management Review**: outlines the procedure for EMS review and modification conducted by top management.
Annex A	**Guidance on the use of the specification**: provides additional information on EMS requirements: A.1 **General Requirements**: outlines the general and specific issues to be included in an EMS A.2 **Environmental Policy**: highlights its importance A.3 **Planning**: focuses on key planning factors: A.3.1 Environmental Aspects A.3.2 Legal and Other Requirements A.3.3 Objectives and Targets A.3.4 Environmental Management Programme(s) A.4 **Implementation and Operation**: highlights the range of activities and role of top management involvement: A.4.1 Structure and Responsibility A.4.2 Training, Awareness and Competence A.4.3 Communication A.4.4 EMS Documentation A.4.5 Document Control A.4.6 Operational Control (no text currently) A.4.7 Emergency Preparedness and Response (no text currently).

Source: BSI (1996a)

Table C.3: ISO 14001 Environmental Management System Specification (ctd.)

Number	Clause Description
Annex A	A.5 **Checking and Corrective Action**: focuses on the specific factors and activities which guarantee effective EMS maintenance: A.5.1 Monitoring and measurement (no text currently) A.5.2 Non conformance and Corrective and Preventive Action A.5.3 Records A.5.4 EMS Audit A.6 **Management Review**: highlights the importance of the process to secure continuous system improvement.
Annex B	**Links Between ISO 14001 and ISO 9001**: identifies links and correspondences between the two standards.
Annex C	**Bibliography**

Source: BSI (1996a)

Table C.4: EMAS Uptake

Country	November 1998	May 2000	May 2001
Austria	141	221	251
Belgium	7	9	9
Denmark	76	137	160
Finland	13	27	31
France	21	36	35
Germany	1,453	2,060	2,140
Greece	0	1	2
Ireland	5	6	8
Italy	8	25	41
Luxembourg	1	1	1
Netherlands	22	25	27
Norway	43	59	65
Portugal	0	0	1
Spain	17	55	88
Sweden	110	156	184
UK	61	73	77
Total	**1,978**	**2,891**	**3,120**

Source: ENDS (2001d)

Table C.5: Patent Specialisation in Environmental Protection Technology (RPA values)*

Environmental Protection Technology Sectors Specialisation 1990 to 1993

	Air	Water	Noise	Waste	Recycling	Nuclear Waste Disposal	Measurement Technology
USA	-29	-23	-32	-19	-31	-45	20
Japan	19	-57	-27	-76	-66	-44	-66
Germany	43	23	35	45	53	-56	1
United Kingdom	2	19	16	-32	-32	54	60
France	-32	1	-26	5	-10	86	53
Switzerland	-24	20	34	5	18	-20	-3
Canada	-51	71	5	25	88	44	45
Sweden	7	49	-36	16	-27	0	-55
Italy	-13	-10	59	2	25	-14	-86
Netherlands	-49	39	2	43	23	0	8

Source: ISI (1996) UBA (1997c)

Table C.6: Environmental Protection Technology as a whole

	Specialisation 1984 to 1992		
	1983 to 1986	1987 to 1989	1990 to 1992
USA	-22	-22	-17
Japan	-62	-50	-35
Germany	40	38	37
United Kingdom	-31	-34	-4
France	31	18	-13
Switzerland	-7	-9	5
Canada	61	33	37
Sweden	42	43	24
Italy	-41	-18	-23
Netherlands	-2	-18	22

Source: UBA 2001

*** The RPA Indicator was developed to better determine the degree of specialisation of patents. Positive integers mean that the share of patents in this sector is higher than for patents altogether. For example, the German RPA value of 43 for the Air environmental protection sector indicates that Germany has a very high share of patent applications in this area compared to the world average.**

Table C.7: International Comparison of Environmental Protection Costs

	Share of Environmental Protection Costs in Gross Domestic Product (%)						
	1988	1989	1990	1991	1992	1993	1994
Australia	-	-	0.6	0.7	-	-	-
Austria	1.7	-	2.0*	2.1*	-	-	2.0
Canada	-	0.9	-	-	-	-	-
Denmark	-	0.5	0.5	0.6	-	-	1.1
France	1.2	1.2	1.2	1.2	1.2	-	1.4
Germany [1]	1.6	1.6	1.6	1.6	1.8*	1.8*	1.8*
Italy	-	0.9	-	-	-	-	0.9
Netherlands	-	1.4	1.7	1.8	1.9	-	2.3
Portugal	0.5	0.5	0.8	0.7	-	-	0.8
Sweden	-	-	-	-	1.2	-	-
Switzerland	-	-	-	-	2.1*	-	-
Spain	0.5	0.6	0.6	0.6	-	-	0.5
United Kingdom	-	-	1.4	-	-	-	1.1
USA	1.4	1.4	1.5	1.5	1.5	-	-

[1] Until 1991 old *Länder.*
* Estimated
Source: UBA 2001

Table C.8: World Trade Shares of Environmental Protection Goods Suppliers (%)

	1989	1992	1993	1994	1995
Germany	21	20.8	18.4	18.3	18.7
USA	17.4	18	19.3	19	18.5
Japan	12.5	11.9	13.2	14.1	14.5
Italy	9.6	9.8	10.6	9.9	9.8
United Kingdom	8.4	7.4	6.9	7.4	7.4
France	7.3	7.8	7.4	7.8	7.3

Source: Niedersächsisches Institut für Wirtschaftsforschung (NIW) 1997

Table C.9: Debt structure by country (percentage of total borrowings)

	Britain	France	**Germany**	Italy	Spain	Overall
Overdraft	**42**	23	**17**	32	14	29
Short-term loans (under 2 years)	**9**	18	**20**	20	45	20
Medium-term loans (2 to 5 years)	**13**	32	**20**	15	19	19
Long-term loans (over 5 years)	**19**	11	**36**	19	20	21
Total	**100**	100	**100**	100	100	100

Source: Bridge et al (1998) cited from P. Burns and O. Whitehouse, Financing Enterprise in Europe 2 (Milton Keynes: 3i Enterprise Centre, 1995)

Table C.10: SME External Sources of Finance

Sources of External Funding (%) - 1998						
	Overdraft	Leasing/ Hire Purchase	Factoring or similar	External equity	Loans	Grants or awards
Austria	35	30	0	2	72	15
Belgium	43	19	6	18	63	10
Denmark	79	20	4	8	36	3
Finland	46	20	4	12	68	11
France	46	38	19	8	59	13
Germany	**48**	**41**	**1**	**18**	**73**	**8**
Greece	35	13	4	6	63	9
Ireland	77	45	9	9	43	13
Italy	86	32	16	8	24	7
Luxem-bourg	41	4	8	16	27	2
Nether-lands	83	16	4	21	45	1
Portugal	19	4	2	12	53	6
Spain	14	40	8	17	59	10
Sweden	7	28	82	5	59	2
United Kingdom	**70**	**41**	**8**	**17**	**43**	**10**
EU Average	53	33	9	13	51	8
Malta	77	9	6	6	31	1
Norway	77	22	3	8	67	3
Poland	28	28	4	31	43	2
Switzer-land	38	22	1	20	46	5
Turkey	7	27	6	25	39	0
Survey Average	**51**	**32**	**8**	**15**	**50**	**8**

Source: European Business Survey (Spring 1998) Grant Thornton/Business Strategies (research conducted at the end of 1997)

Table C.11: SME Loan Lengths

Length of Loans (%) - 1998			
	Up to 3 years	3 - 5 years	Over 5 years
Austria	16	9	38
Belgium	8	20	32
Denmark	7	7	19
Finland	10	18	33
France	8	23	22
Germany	**17**	**16**	**34**
Greece	35	7	2
Ireland	7	10	20
Italy	7	7	8
Luxem-bourg	2	6	19
Nether-lands	9	9	26
Portugal	34	9	3
Spain	19	14	10
Sweden	22	11	16
United Kingdom	**9**	**11**	**20**
EU Average	14	13	17
Malta	6	13	11
Norway	5	25	30
Poland	33	2	4
Switzer-land	15	8	14
Turkey	24	3	2
Survey Average	**15**	**12**	**16**

Source: European Business Survey (Spring 1998) Grant Thornton/Business Strategies (research conducted at the end of 1997)

Table C.12: European Business Survey Response Breakdown

Breakdown of responses by country 1998						
	Response	% of total	Sample size	Response rate	Response rate last year	Change
Germany	718	12.4	8,000	9.0	7.3	+
UK	805	13.9	7,000	11.5	8.9	+

Proportion of responding companies in each sector (%)			
	Manufacturing	Construction	Services
Germany	34	12	54
UK	34	8	59

Proportion of responding companies by employment band (%)								
	1-10	11-25	26-50	51-100	101-200	201-250	251-500	501+
Germany	17	31	25	15	7	2	2	2
UK	8	14	21	21	19	5	8	4

Source: European Business Survey (Spring 1998) Grant Thornton/Business Strategies research conducted at the end of 1997)

Appendix D
EU Principles: Subsidiarity, Proportionality, Proportionality and *Vorsorge*

The Subsidiarity Principle

The subsidiarity principle is legally defined by Article 5, second paragraph (3b) in conjunction with Article 2(2) of the EUT. Although the term did not form part of earlier Community Treaties it has been an operative principle from the outset of the European Community movement[167]. Its application to environmental concerns became particularly manifest under Articles 130r, 130s and 130t of the Single European Act[168], Article 3b of the Maastricht Treaty and latterly Article 5 of the Amsterdam Treaty. Subsidiarity defined under the SEA 1987, Article 130r(4) was the:

> "... action relating to the environment to the extent to which the objectives ... can be attained better at the Community level than at the level of the individual Member States..."

whereby Article 130t ensured that:

> "The protective measures adopted in common pursuant to Article 130s shall not prevent any Member State from maintaining or introducing more stringent protective measures compatible with this Treaty."

The subsidiarity principle recognises national executive competence as a more suitable means of translating legislative objectives than would otherwise be possible on a Community level. Subsidiarity also accommodates qualitative variations within national programmes in response to a common legislative objective and allows for the analysis of structural differences between national environmental executives. In practice, however, intra-national environmental policy making, reflecting geographic and industrial variance within regions, is not widely practised in the EU. It would appear that subsidiarity principle provisions covered by the SEA 1987 have been essentially carried forward to the Maastricht and Amsterdam Treaties despite voiced concern that the impact of the subsidiary principle has been in some sense compromised. Freestone and Somsen (1997) for example, argue that the general subsidiarity provision applying to all areas of Community activity alongside the proportionality clause shifts the burden of proof onto the Community to demonstrate that environmental action is required and best conducted on the Community level (Freestone and Somsen 1997, p. 90). Yet the new subsidiarity and proportionality clauses suggest that the Community has in fact strengthened its hand without diluting the Member State option to introduce stricter measures of national environmental protection. Subsidiarity and proportionality are described in Article 5 of the Amsterdam Treaty as follows:

> "... the Community shall take action, in accordance with the principle of subsidiarity, only if and insofar as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can, therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community..."

As before, the subsidiarity principle targets the policy objectives of the locality, region, Member State and the Community. By guaranteeing devolution of power between the levels of executive authority of locality and Community, subsidiarity ensures that the exercise of decision-making is shared by the citizen without

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[167] Article 5 of the ECSC Treaty stated that the member countries is at liberty to follow regional and national policies determining coal and steel production unless particular circumstances demanded direct Community intervention.

[168] SEA 1987 Article 130s decoupled environmental legislation from its economic imperative under the Treaty of Rome, whereby environmental legislation would be introduced on the basis of the unanimous agreement of the European Council. Alternatively, the Council could unanimously decide to make a decision on the basis of qualified majority. Article 100a(4) of the SEA should also be mentioned in the context of subsidiarity since it prohibited national deregulation measures as a means to achieve a uniform internal market within the Community but 'self-determination' could be exercised by Member States through the introduction of a more stringent interpretation of regulatory measures in harmony with Community objectives.

lowering the environmental standards of the European Community (European Commission 1997). Article 5 of the EUT quoted above describes the preconditions for Community action in harmony with the principle of subsidiarity as follows: (i) the issue should not challenge concerns defined as under the Community's exclusive competence; (ii) the objectives of the issue cannot be effectively fulfilled by Member States; (iii) the issue would be more effectively addressed by the Community. The EUT rescinds the opportunity to challenge Community action once enjoyed by Member States under the ECT, whilst failure to effectively introduce targetted measures through national competence undermines the capacity of Member States to operate in liaison with the Community.

The Proportionality Principle

The subsidiarity principle as outlined in Article 5 of the EUT, operates in relation to proportionality. Like subsidiarity, the proportionality concept is rooted in early European Community traditions[169]. The use of the term within the European Community is described as mirroring the principle found in German administrative law, *Verhältnismässigkeit*, which holds that 'State power may only encroach upon individual freedom to the extent that it is indispensable for the protection of the public interest'[170]. In cases where guidelines or Directives are to be applied on a Community-wide basis the European Council may decide that it will exercise its decision-making powers by allowing Member States to determine how it will contextually apply conferred provisions. Therefore, the subsidiarity principle is employed to determine at which Community level an action will be exercised, whilst the proportionality principle crystallises the measures which will be adopted at a national level in conformance with requirements of the guidelines or Directive. In an environmental context, proportionality reflects national understandings of environmental objectives and the measures required to achieve the targets of a uniform Community Environmental Policy. It is from within the parameters of proportionality that evaluative differences in environmental measures between nations can be analysed. As provided for under Article 100a(4) of the SEA 1987, proportionality under the EUT recognises that qualitative and quantitative variations in environmental legislation can exist between Member States in relation to the base Community framework regulations or Directive requirements[171]. In practice it is not possible for a Member State to refrain from applying the proportionality principle where subsidiarity is exercised. Proportionality may also be justified in the European Court of Justice in adherence to an international Environmental Agreement which transcends European regulations[172]. Protocol Number 30 attached to the Treaty of Amsterdam defines the conditions under which the

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[169] This principle formed part of the legal framework of the ECSC, where it was held that necessary social burdens should be allocated in proportion to the capacity of members of a society to accommodate such responsibilities or actions for the benefit of society as a whole (McIntyre 1997).

[170] Quoted from Jowell and Lester 'Proportionality: Neither Novel Nor Dangerous', in McIntyre (1997) p. 104.

[171] The introduction of higher environmental standards should not contravene the demands of Articles 30 and 36 of the EUT. Article 30 serves to restrict any practice within the Community which results in the direct or indirect hindrance of intra-Community trade. Article 30 is qualified by Article 36 which allows restrictions justified on the basis of "... public morality, public policy, or public security; the protection of health and life of humans, animals or plants; the protection of national treasures possessing artistic, historic or archaeological value; or the protection of industrial and commercial property' providing such restrictions do not 'constitute a means of arbitrary discrimination or a disguised restriction on trade between Member States'..." (McIntyre 1997, p. 112).

[172] For example the Montreal Protocol aimed at a 50% reduction in the consumption of CFCs by 1999 and halt the production of halons in 1992. Other ozone-depleting substances included carbon tetrachloride, methyl bromide and trichloroethane. Regulation EC/3093/94 was adopted in response to the Montreal Protocol. However, some Member States introduced 'precautionary' national measures which banned the marketing of ozone-depleting products, although the EC regulation only included measures to prevent the production and consumption of products in the Montreal Protocol without objections being raised by the European Commission (McIntyre 1997, p. 115).

subsidiarity and proportionality principles will be generally observed by all Community institutions:

> "The principle of subsidiarity does not call into question the powers conferred on the European Community by the Treaty, as interpreted by the Court of Justice.... The principle of subsidiarity provides a guide as to how these powers are to be exercised at the Community level. Subsidiarity is a dynamic concept and should be applied in the light of the objectives set in the Treaty. It allows Community action within the limits of its powers to be expanded where circumstances so require, and conversely, to be restricted or discontinued where it is no longer justified."

The text reconfirms that the subsidiarity and proportionality principles apply only within those spheres of competence shared between the European Community and the Member States. Which spheres fall into the exclusive Community and shared categories is not always immediately definable since Article 308 of the EUT allows the European Union to increase its locus of control in order to satisfy treaty objectives[173]. A definition of Community exclusive and shared categories is likely to remain subject to the dynamics of policy decisions rather than defined levels of expertise for as long as Article 308 retains its highly revisionist character.

The Proportionality and *Vorsorgeprinzip*

In the German constitutional context a request for a change in State practice will only be considered if such a request successfully satisfies the criteria of proportionality (*Verhältnismäßigkeit*). Central to the principle of proportionality are the notions of 'propriety' (*Geeignetheit*) and 'essentiality' (*Erforderlichkeit*)[174]. The notion of 'propriety' determines the actual grounds upon which the claim of risk is based. These must be substantial before the Constitutional Court will consider an appeal for constitutional change. This also accords with the conclusions of the Federal Supreme Administrative Court (*Bundesverwaltungsgericht BVerG*) which states that contemplated or introduced measures should not be "patently inappropriate"[175], since the state of being "patently appropriate" before the constitutional law implies the possibility of both legal justification and enactment of the request. The level of scrutiny which characterises the examination of proposed changes to jurisdiction is in direct relation to the implications that such a change would have on State intervention practices[176].
'Essentiality' requires that the final option should be the most suited for the circumstances and have the least unfavourable impacts on the basic rights of those affected. Therefore, where alternative and effective measures can be introduced (i.e., informal agreements, self regulation, resolutions, or financial support) instead of fundamental compulsory impositions, the latter will be selected ahead of the former[177]. The exercise of proportionality is an exercise of legal balance, requiring that the impact of the source of potential danger be carefully measured against the positive and negative impacts associated with constitutional change[178]. Where potential danger cannot be established in view of knowledge deficits, it is reasonable to anticipate difficulties establishing the proper basis of legal claims. Therefore, the proportionality principle should not be perceived as the panacea through which all motions involving *Vorsorge* can be adequately quantified. This

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[173] "If action by the Community should prove necessary to attain, in the course of the operation of the common market, one of the objectives of the Community and this Treaty has not provided the necessary powers, the Council shall, acting unanimously on a proposal from the Commission and after consulting the European Parliament, take the appropriate measures". (EUT Article, 308).

[174] Illig (1992) p. 111.

[175] *„eindeutig zweckuntauglich"* - BVerfGE 39,210(230) quoted from Fleury (1993) p. 90.

[176] BVerfGE 20, 150 (159) ibid., 90.

[177] See also Illig (1992) p. 278.

[178] *".... Auch hier lassen sich nicht abstrakt die Rechtsgüter „Umwelt" und (z.B.) „Eigentum" gegenüberstehen, sondern daß auf die konkrete Beeinträchtigung dieser Rechtsgüter und auf deren Maß und Wahrscheinlichkeit im Einzelfall abzustellen ist. Schon deshalb kann eine formelhafte Berufung auf ein „in dubio pro natura" die Abwägung im Einzelfall keinesfalls ersetzen..."* (underlined text in italics in original) Fleury (1994) p. 91.

legal tension equally emphasises the importance of materially distinguishing between significant dangers and minor risks, since the extent of potential danger may be a largely unknown quantity and the exercise of proportionality will not compensate for or support poorly substantiated applications promoting *Vorsorge* measures[179]. The procedure for engaging the Supreme Court under UK law[180] which reviews the acts and decisions of public and private concerns, would operate identically if the so-called 'Precautionary Principle' enjoyed a similar legal status in the UK environmental policy framework.

[179] ibid, p. 92.

[180] The Supreme Court Act (1981) section 31 and Order 53 of the Rules of the Supreme Court define the conditions for judicial review. See Mumma (1996) p. 129-142.